
White Paper

# System z Central to IBM's Burgeoning Information on Demand

## Cognos Buy, New IOD Software Powering Strong Growth

## About this White Paper

Data *(structured and unstructured)* is central to business in most enterprises today, but should now be more strongly leveraged for competitive advantage. However, today's large, fast-growing, but widely-scattered enterprise data pools make access to critical data too difficult and costly. IBM's 5-years-in-the-making, $15B-invested, Information On Demand *(IOD)* strategy squarely addresses this huge challenge. Since its launch in 2006, customer adoption soared and IBM IOD-driven revenues rocketed. The IT giant now offers a full portfolio of advanced products that deliver its IOD vision enterprise-wide under a Service Oriented Architecture *(SOA)*. These are the main focus of this new Software Strategies White Paper.

This decade saw sharp growth and robust resurgence of the System z mainframe, driven by soaring new workloads, new enterprise-wide roles, and new wins in emerging *(BRIC growth)* markets, tripling installed MIPS from 2000 to 2007. Enterprise SOA adoption has also mushroomed. Several thousand users already based SOA developments on their System z platforms. Sustained z economics improvements, and stellar "green IT" credentials, now make mainframes the lowest-cost platform for many larger workloads.

Now, the next-generation System z10 Enterprise Class *(z10 EC)* high-end mainframes, powered by IBM's stunning z10 quad-core mainframe MPU, are shipping from February 26th, 2008, with 1.7-times higher capacity, scores of other major advances, and a still-stronger value proposition.

In this new 2008 White Paper, specialist mainframe analysts Software Strategies overviews IBM's comprehensive and deeply impressive IOD strategy and its evolution to date *(see Section 2)*.

We recap the major trends, successes, advances and developments of the System z mainframe platform itself over its recent years of resurgent growth, including a quick look at the new, next-generation System z10 EC high-end family *(see Section 3)*.

In Section 4, we assess and evaluate the new BI/EPM upper layer of IBM's IOD architecture, just radically expanded and transformed by IBM's largest-ever *($5B)* acquisition of BI/EPM tools leader Cognos. The Cognos 8 BI family is already now fully integrated with IBM's IOD Information Platform *(see next paragraph)*.

In Section 5, we evaluate the main new software servers comprising the IBM IOD Information Platform – the middle layer of the IOD software architecture. We review the impressive IBM Information Server for System z, the IBM InfoSphere Warehouse, and the IBM InfoSphere Master Data Management Server, here. We also review the new IBM Data Studio data-centric AD tool.

The System z mainframe's foundation data servers *(DB2 and IMS)* each have major new releases underpinning IOD on the platform *(DB2 for z/OS V9, and IMS V10)*. New releases of the equivalent IBM Content Management *(V8.4 release)*family of ECM products *(for unstructured content data)* are also out; we examine these fully in Section 6.

IBM's stunning run of 25 IOD ISV acquisitions that speeded its path to market with today's IOD offering portfolio are reviewed in Appendix A. The 95 IBM DB2 and IMS database tools are overviewed in Appendix B. Other interesting, recent IOD products *(not covered elsewhere)* are assessed in Appendix C.

Last mentioned here, but first in this White Paper's running order, Section 1 provides an abridged Executive Summary of our main findings; providing a rapid overview for busy executives.

This White Paper is second of three, each covering an important area of leading-edge, System z mainframe software advances, in compatible formats. The other two in this series are:

- **Service Management Center for System z Underpinned by Powerful Tivoli z Management Portfolio** – New mainframe role enabled by an extensive new and enhanced range of ISB IBM Tivoli systems management products for System z. *(Was published May 2008.)*
- **New IBM Smart SOA, Enterprise Modernization, & AD Software Powers System z's Enterprise-wide SOA Role** – A close look at the latest IBM SOA Foundation and ecosystem developments from the mainframe perspective. *(Published May 2008.)*

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# 1. Executive Summary

Our White Paper's abridged findings/conclusions are given below, based on the fuller analyses of our main Sections, links to which are noted.

1. **2008 Systems Market Mega-trends:** 2008's global credit crunch saw economies weakening, markets fall. Our top 12 2008 system market mega-trends are shown in Figure 1. IBM's System z mainframe exploits/leads on over ten of these. Our White Paper focuses on Information On Demand *(IOD)* with System z, because these factors made System z the enterprise-wide **"IOD central platform"** of choice. IOD? Read 2 below.

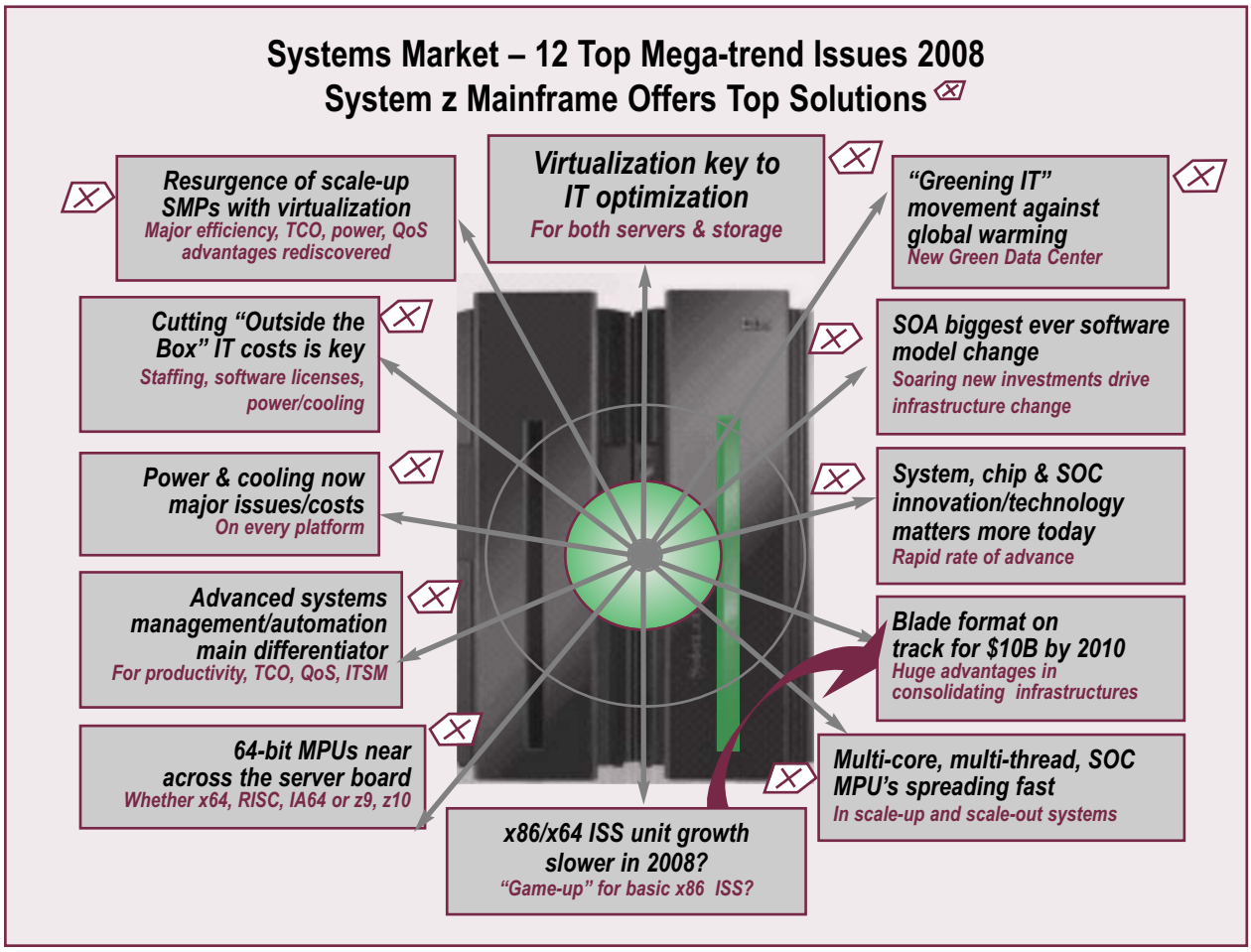


**Figure 1: Systems Market – 12 Top Mega-trend Issues 2008 – System z Mainframe Offers Top Solutions**

2. **Introducing "Information on Demand":** IOD is IBM's ambitious vision/strategy to provide software, solutions, and services enabling customers to deliver accurate, consistent information, as-and-when needed, from structured data and unstructured content, over the whole enterprise/ecosystem under a Service Oriented Architecture *(SOA)* and on open standards.
3. **IOD's "Holy Grail" Tough Challenge:** IOD's Holy Grail is fast delivery of trusted, reliable, accurate, and current information, within correct business contexts, to all "client" applications, business processes, and staff, over the enterprise. Most businesses today remain far from this ideal, wrestling with fast-growing, highly-distributed/fragmented data, with access too difficult/costly, and the Grail's **"single-source-of-the-truth"** is often non-existent. Some challenge!
4. **Two Years in, IOD Booms:** IBM's impressive IOD strategy saw daylight first in February 2006, after 3 years prior development. Now, just 24 months later, with 25 IBM IOD ISV acquisitions integrated, IBM investments nearing $15B, a broad, powerful IOD software, solutions, and services portfolio has now been developed, delivered, and deployed to a now-booming IOD customer base.

5. **IBM Miles Ahead on IOD:** Such dramatic moves pushed IBM well ahead of traditional IM competitors, to grasp a strong lead in the IOD-redefined IM market. Microsoft barely registers on IOD, with Oracle more focused on its huge enterprise applications and SOA middleware challenges. IOD is thus fast becoming another big IBM Software *(SW)* competitive triumph, *(as well as technology tour-de-force)* of similar potential future scale to its now market-dominant SOA thrust.

*IOD is thus fast becoming another big IBM Software (SW) competitive triumph, (as well as technology tour-de-force)...*

6. **IOD's Big Advances Meet Real Business Needs:** Wrenching business process/model change, tougher competition, and widespread new collaborations impose stringent, wide-ranging "better information" needs in every enterprise, including:
   - **Improving customer service.**
   - **Optimizing operations.**
   - **Increasing agility and competitiveness.**
   - **Complying fully with regulations.**

   Now in 2008, IOD delivers powerful new ways enterprises can federate, integrate, manage, aggregate, transform warehouse, and analyze dynamic information, structured and unstructured, far more effectively than ever before. *(Points 2 to 6 are covered in Section 2.)*
7. **Strong Mainframe Resurgence 2000-2007:** Powered by IBM's multi-$B, decade-long transformation, driven by burgeoning new workloads, plus new enterprise-wide roles, System z enjoyed major resurgence this decade. Installed MIPS more than trebled in just seven years; topping 11.1M MIPS *(end Q1 2007)*. Specialty processor engines, middleware, and radical pricing changes, enabled this excellent, new workloads-driven System z growth.
8. **2005-2007 System z9 Generation, Big Success:** Developed Western IT markets re-embraced the System z mainframe, and many major enterprises in the fast-growth, emerging markets, like Brazil, China, India, and Russia *(BRIC and similar)* became new System z mainframe users.
9. **SOA Adoption Soars, System z Platform Central:** SOA, the biggest-ever application software architecture advance, enjoyed soaring adoption since 2005, with System z mainframes now hosting thousands of customer SOA projects. IBM's comprehensive SOA Foundation on z, together with unequalled z Quality of Service *(QoS)* attributes, perfectly equipped System z for such "prime enterprise SOA host" duties.

*...System z the lowest-cost platform for many larger, mixed commercial workloads it is today.*

10. **Leanest, Greenest, Lowest-cost Platform:** Contradicting old myths, radical mainframe hardware/software cost cuts, virtualization-based efficiency, extensive automation-driven low staff needs, plus outstanding "green IT" strengths, made System z the lowest-cost platform for many larger, mixed commercial workloads it is today.
11. **New 2008 z10 Mainframes Boosts Capabilities:** The stunning new System z10 Enterprise Class *(z10 EC)* high-end mainframe family, powered by the impressive, new IBM z6 quad-core, ultra-high frequency *(4.4GHz.)* MPU chip, reached market end-February 2008. This z10 family offered huge capacity, performance, and economics advances, including:
    - **z10 Optimized for Key z Roles:** Enterprise apps., data-serving, Business Intelligence *(BI)*/DW, SOA, IOD, Linux extreme virtualization.
    - **Higher Top-end System z10 EC Capacity:** Top z10 EC capacity up 70% *(over z9 EC)*, scales to 64-CP SMP.
    - **Massive MPU Bandwidth:** 182GB/s total per-z6-MPU-chip bandwidth, via new **SMP Hub** chips.
    - **System z "Extreme-CISC ISA":** 894-instruction ISA *(50 new z6)* continues z tradition and compatibility.
    - **Close Sibling to POWER6:** z6 MPU is a close sibling, and not an identical twin. It shares much of its DNA and components, process technology.
    - **Industry's Most Extensive RAS:** z10 highest reliability and availability of any commercial system.
    - **Extended "Extreme Virtualization":** Top-end z10 now runs 500-800 beefy Linux-on-z/VM virtual servers.
    - **+/- $1B z10 Mainframe Generation IBM Investment.**
12. **Unprecedented System z Middleware Advances:** Traditional System z subsystems *(DB2, IMS, CICS, WAS MQ, NetView, etc.)*, newer WebSphere-based IBM SOA Foundation Suite servers *(and related tools)*, and now the IOD z portfolio, saw unprecedented advances from 2005-07. Now in Q1 2008, IBM's mainframe software stack is at its best-ever strength, our studies found. *(Points 7 to 12 are covered in Section 3.)*

13. **Dynamic BI/EPM Top C-Level Executive 2008 Priority:** BI remains a top 2008 priority for CIOs, and Enterprise Performance Management *(EPM)* ditto for CFOs. Enterprises now need a common BI/EPM platform able to improve enterprise performance, with dynamic, real-time BI/EPM solutions replacing inadequate, old-style, historical BI analysis approaches.

14. **Three Buys Transform BI/EPM Tools Market:** Long an ISV stronghold, three big BI/EPM vendor acquisitions by software giants reshaped the entire BI/EPM tools market since last year. These dramatic events were:

    - **Oracle's April-2007 Hyperion Solutions Corp. Buy:** For $3.3B, bringing Oracle 2,700 staff, and $765M *(prior FY)* revenue.
    - **SAP's January-2008-closed Business Objects Buy:** For $7.1B, adding Business Objects' $1.51B revenues *(up 20%)*, c. 5,500 staff, and c. 45,000 customers into the SAP fold.
    - **IBM's February-2008-closed Cognos Buy:** For $5.0B, adding Cognos 8 BI portfolio, $1.0B revenue, 4,000 staff, >25,000 customers, and >3,000 business partners, into the IBM IOD fold.

15. **Cognos – IBM's Largest-ever Acquisition:** Hugely important to IOD, Cognos was **IBM's largest-ever acquisition**, of Canada's largest software firm, and a long-time BI/EPM segment leader. After 15 years of close IBM-Cognos partnership, the products were already tightly integrated, and joint solutions sales effort well-established. This was a near-perfectly-complementary, zero-overlap acquisition. It instantly brought IBM's IOD portfolio real leadership BI/EPM capabilities, with the **extensive Cognos 8 BI platform/suite**.

*...Cognos was IBM's largest-ever acquisition, of Canada's largest software firm...*

16. **Blockbuster IBM-Cognos IOD Announcement:** Just 2 days after deal closure, on February 6th, 2008, IBM-Cognos showcased their extended IOD strategy and blasted out a powerful set of additional, joint product integration, industry solutions, and BI/EPM services offerings, early acquisition synergies brought super-fast to market. Announced were:

    - **6 new, pre-integrated IBM-Cognos offerings.**
    - **10 new/enhanced IOD industry solutions.**
    - **New "Cognos Builder" software.**
    - **New IBM GTS IOD practice & new services.**

    At its February 26th, 2008 System z10 mainframe launch, IBM announced Cognos 8 BI for Linux on System z, sought Beta participants, and set General Availability *(GA)* ship-date to within 2H 2008. This major advance will let z customers directly report/fully analyze hundreds of millions of System z-based transactions in IOD dynamic warehouses hosted on mainframes. *(Points 13 to 18 are addressed in Section 4.)*

*...IBM announced Cognos 8 BI for Linux on System z...*

17. **Six, New, Pre-integrated IBM-Cognos Offerings:** Further extending their now-combined portfolios, these six new, IBM-Cognos-bundled integrations/offerings were announced:

    - **Cognos 8 BI "Starter Pack"** with **IBM InfoSphere Warehouse**, plus *(limited)* **IBM InfoSphere Warehouse** with **Cognos 8 BI**.
    - **Cognos 8 BI & Data Manager** pre-integrated with the **IBM Information Server**.
    - Pre-configured integration template to use **Cognos 8 BI** with **IBM FileNet Business Process Management *(BPM)*** software.
    - Pre-integrated **IBM Dashboard Accelerator "Starter Kit"** with **Cognos 8 BI. IBM Dashboard Accelerator** now also includes **Cognos 8 BI "Starter Pack"**, plus the new **"Cognos Builder"** tool.
    - **IBM C-Class Balanced Warehouse** now includes **IBM-Cognos 8 BI software**.
    - New **IBM Compliance Warehouse for Legal Control**, complete solution offering as name implies.

18. **Ten New/Enhanced IOD Industry Solutions:** IBM-Cognos also announced the following vertical industry IOD solutions:

    - **Financial Risk Insight for Banking Solution.**
    - **Risk Adjusted Profitability for Banking Solution.**
    - **Health Analytics Solution.**
    - **Life Sciences Promotional Spending & Compliance Solution.**
    - **Workforce Analytics Solutions.**
    - **IBM Municipal Scorecard Blueprint.**
    - **Crime Management and Insight.**
    - **Manufacturing Sales & Operations Planning.**
    - **Store Operations & Planning for Retail Integration Framework.**

19. **IBM's IOD "Information Platform" on System z Emergent:** Providing IOD's middle layer, a new generation of advanced, technology-leadership IBM servers for System z *(and other platforms)* is emerging, including:

    - **IBM Information Server for Linux on System z:** New enterprise-wide, mainframe-based, information integration server powerhouse, became available November 2007.
    - **IBM InfoSphere Master Data Management *(MDM)* Server for Linux on System z:** New multiform MDM server on mainframe. *(To ship for System z 2H 2008, says IBM. Distributed server versions out now.)*

    These servers unify, transform, and deliver enterprise-wide "information as a service" to the top IOD layer, often now of IBM Cognos BI/EPM tools, and to all other enterprise SOA "information client applications".

20. **IBM InfoSphere" – New IOD Brand-words Emerge:** Starting January 2008, IBM began naming its newest IOD servers with the new brand-words prefix **"IBM InfoSphere…"** This it will successively apply to all new IOD products, and will also rename existing IOD product releases, as new versions ship. This, IBM hopes, will do as well for IOD as the "IBM WebSphere..." brand-words prefix so successfully did for IBM's application serving and SOA integration middleware over this decade.

21. **IBM Information Server for System z:** This flagship IOD enterprise information integration server reached System z mainframe release in November 2007, 12 months after its distributed platform debuted. The Server profiles, cleanses, transforms, and delivers information, from both mainframe and distributed sources together, to contribute greater business insight, but without added z/OS operational costs. It supports all System z IOD initiatives, such as BI, real-time reporting, EPM, data migration, data warehousing, data governance, CRM, and SOA projects. It provides extensive ETL capabilities, source profiling and data rules monitoring to exclude "bad" data, and standardizing and matching multi-sourced data. It also offers unified metadata management, analysis and interchange, metadata visualization and source tracing, offers a powerful business terms glossary *(desktop search and host server-based)*, includes an information services directory to enable reuse, and adds extensive connectivity for federated data access support.

    The Server thus provides rich capabilities to understand/integrate data from many disparate/heterogeneous data sources, to cleanse data to ensure consistent quality, and to transform, move, access, and restructure, diversely-sourced information so as to deliver trusted, lineage-proven, IOD service enterprise-wide on/from a central System z mainframe host. It also integrates the vital services of shared metadata, logging, security, a service registry, configuration, and installation, giving extensive control of data/information assets manageability, for compliance and audit. The Server provides a single, unified, fully virtualized view of all enterprise information it knows of. Extensive support for SOA open standards is built in, enabling easy integration with SOA "client" applications, as well as Data Warehouses *(DWs)*, etc. The IBM Information Server was also architected for scalable high-performance and resilience, in-keeping with its crucial, enterprise-wide hub role.

22. **IBM InfoSphere Warehouse V9.5 for distributed platforms:** This renamed foundation IOD server release went GA at end-January 2008 based on DB2 V9.5. Customers use it to implement/adopt **IBM's Dynamic Warehousing strategy** *(revealed March 2007)* of real-time, dynamically-operating BI/EPM, helping to optimize every transaction as it happens. This release adds extreme workload management capabilities enabled by the **DB2 "Viper 2" V9.5 data server** *(see point 28 below)*, plus other industry-first advances in embedded analytics, high DW performance, and support for both structured and unstructured information, etc. It again offers comprehensive, rich, powerful, pre-integrated DW functionality within a single, fully packaged DW server, for faster and more-seamless deployment. The advanced new/enhanced DW services now provided by this major release include:

    - **Integrated Online Analytical Processing *(OLAP)* Cubing Services.**
    - **Embedded Unstructured Analytics.**
    - **Extreme Workload Management.**
    - **Enables "One DW" No-Copy Analytics.**
    - **DW Performance Management Suite.**
    - **Enhanced, Simplified Data Movement/Transformation.**
    - **Easier to Build Analytical Application.**
    - **DB2 "Viper 2" V9.5 DM Enhancements.**

    *This impressive IBM data warehousing server will radically alter how enterprises implement data warehousing...*

    IBM InfoSphere Warehouse V9.5 first shipped *(under a prior name)* at end of October 2007 for distributed servers. This release adds these important new data warehousing services that advance IOD capabilities substantially. This impressive IBM data warehousing server will radically alter how enterprises implement data warehousing over the next decade, we consider.

23. **IBM InfoSphere MDM Server – First-ever Unified MDM Software:** Master data is the common base information that all enterprise operations are based on. Today, it is often strewn inaccessibly across legacy silo sources. Tackling this huge challenge head-on, with its new approach of **multiform MDM**, IBM recently released its new IBM InfoSphere MDM Server to GA at the end of January 2008. This new IOD server enables users to centrally manage all critical master data processes – storing, maintaining and updating customer, product and account data *(and many more)* – enterprise-wide, from this industry-first, single, unified, MDM product. It offers sophisticated functionality and security rules for defining, creating, accessing, viewing, and editing, such master data, and using it as a strategic business asset over the whole the enterprise. Designed for use within an SOA, the Server comes with over 800 pre-defined business services that may be used out-of-the-box. These enable it to manage both complex and simple master data inquiries and updates. It also contains built-in intelligence/insight from the data which may be injected into day-to-day business transactions for improved operations across sales, marketing, and finance. IBM has announced that the **IBM InfoSphere MDM Server for Linux on System z** will ship in 2H 2008, allowing its natural System z home deployment.

24. **Other IBM MDM Offerings:** This newer IOD discipline is now an important, fast-growing middleware/services market. IBM now has a 1,000+ staff-strong MDM unit, assembled from acquisitions, supporting this area and now also *(in addition to major new MDM offering above)* offers new versions of its original two MDM products:

    - **WebSphere Customer Center V7.0.1:** For transactional customer master data integration, considerably enhanced, recent new release, with new IOD integrations and other advances.
    - **WebSphere Product Center:** For enterprise product master data/information management in product-centric industries. New version due within 2H 2008.

    These are each leaders in their segment, and each built on a DB2/WebSphere platform base.

25. **IBM Data Studio Tools Platform, Cuts DB Development by <50%:** New Web and Eclipse-based, integrated data management tool platform, sharply improves designing, developing, deploying, and managing IOD databases and DWs. Built for database developers and DBAs, enabling them to manage enterprise data from anywhere and anytime, over the Web. The tool posts up to 50% DB development time/cost savings. It comprises the "Info 2.0-ready" **IBM Data Studio Developer V1.1** development tool *(including an integrated query editor for SQL & XQuery)*, and the **IBM Data Studio pureQuery Runtime V1.1** runtime environment. Shipped December 2008. *(Points to 19 to 25 are covered in Section 5.)*

26. **System z Premier, Enterprise-wide, Data-serving Platform:** Intense development made the System z mainframe today's premier, highly-differentiated, enterprise-wide data-server, the best-equipped to underpin IOD and SOA initiatives. To reach this pinnacle, IBM fully exploited all the latest System z *(e.g. z10)* hardware's power, memory, and I/O capacity, and top QoS attributes. It also radically upgraded both its principal mainframe database server engines, so that both today deeply embrace and support SOA/XML and IOD needs. *(See points 27, 28, 30, 31, & 32 below.)*

27. **DB2 "Viper" for z/OS V9, 12 Months Field Success:** This prior DB2 for z/OS release, shipped March 2007, was the first unified hybrid relational/XML database system. Highly successful, it enjoyed rapid adoption and field deployment in its first year. The release included hundreds of new features, extended security, enhanced deep storage compression, and increased performance, with other highlights including:

    - **Patented IBM pureXML™ Technology.**
    - **XQuery & SQL Query Support.**
    - **Exploits zIIP Specialty Processors.**
    - **Extensive Optimizations, Portability Gains.**
    - **BI/EPM, Dynamic Warehousing Support, and Performance Gains.**
    - **New/Enhanced Extensive DB2 Tools Suite.**
    - **Extensively Optimized for SAP.**
    - **Helps Manage Risk and Streamlines Compliance.**
    - **First DBMS Supporting All Three Partitioning Modes.**
    - **Simpler to Use/Support, Less DBA Work/Costs.**
    - **Enhanced Autonomic Brings Lower Total Cost of Ownership *(TCO)*.**

    This version thus provided extensive SOA support, stronger WebSphere integration, and IOD foundation services to enable enterprise BI/EPM and dynamic warehousing.

28. **DB2 "Viper 2" V9.5 Posts <200% XML Performance Gains:** This latest, DB2 "Viper 2" V9.5 release, available *(distributed servers)* since November 2007, featured new data automation, and major XML performance, enhancements. New pureXML facilities showed <200% XML data transactional performance gains, and <500% XML storage space savings. "Extreme autonomics", including automated/autonomic deep compression, memory management, and integrated failover/backup, provide, says IBM, the most automated functionality of any DBMS. These also provide the foundation for IOD dynamic data warehousing *(see IBM InfoSphere Warehouse V9.5, point 22)* and BI/EPM.

> *...provide, says IBM, the most automated functionality of any DBMS.*

29. **Complete BI/Dynamic Warehousing Support on System z:** Dynamic warehousing, with real-time BI, embedded analytics, and unstructured data access, and supporting many-fold-more enterprise users, are the main IOD imperatives. The System z-z/OS-DB2 data-serving trio underpins IBM's dynamic warehousing mainframe solution. This, in 2008, now comprises:
    - **DB2 "Viper" for z/OS V9** *(out now)* and the next release of DB2 for z/OS, of which no details or schedules have yet been disclosed.
    - **IBM InfoSphere Warehouse:** Naming expected to be use for next DB2 for z/OS release DW features, not announced.
    - **DB2 Alphablox:** Embeds analytics directly into Web-based applications.
    - **IBM DataQuant for z/OS:** BI query, charting, analysis, and dashboards tool.
    - **WebSphere DataStage for z/OS:** Powerful data integration/transformation ETL tool for DW loading.
    - **WebSphere Replication Server for z/OS:** HA & real-time access to replicated data DB2 for z/OS-to/from other DBs.
    - **DB2 Query Management Facility *(QMF)*:** Tightly integrated, reliable, long-established standard query/reporting tool for DB2.
30. **IMS – Thriving After All These Years:** After 35 years, this legendary, respected, high-performance hierarchical mainframe DBMS/TP system is thriving. Run by 95% of Fortune 1000 firms *(& 1000s more)*, 50B transactions for 200M end users, run daily through IMS databases on System z. Recent year's releases *(V8 V9, & now V10 – see point 31 below)*, saw heavy IBM IMS and IMS tools reinvestment to modernize and extend this powerful data server, now a bedrock foundation for enterprise SOA and IOD on System z.
31. **IMS V10 – First-class XML, Web Services Integration:** Major, new, October 2007 release, with much-enhanced XML and Web services support, allowing the wider exploitation of IMS assets *(data, transactions and applications)* in enterprise SOA & IOD initiatives. Improved IMS information integration, open standards, AD tools, added manageability, and enhanced scalability, with traditional IMS security and availability, were the IMS V10 headline advances. It further boosted the enterprise data server's strong Agility, Performance, Compliance, and Efficiency attributes. Strong autonomic advances cut support costs, and enhanced zAAP and z/OS exploitation cut processing costs, sharply improving IMS economics. New V10 technologies that extend IMS assets exploitation for SOA and IOD initiatives include:

    *...with much-enhanced XML and Web services support...*

    - **New XQuery, Enhanced XML & Web Services Support.**
    - **Broader XML & Java Tooling.**
    - **Dynamic Resource Definition.**
    - **Extensive IMS Tools Suite – 46 Tools.**
    - **Enhanced Database Recovery Control.**
    - **Enhanced Multiple Systems Coupling and Security.**
    - **New IMS SOAP Gateway.**
32. **IMS SOA Integration Suite Eases Integration:** SOA-supportive IMS utilities Suite for connectivity, data representation, AD, Web access *(to IMS data, transactions, & applications)*, and ad-hoc IMS queries. Enables modernization, integration, and full participation of IMS into composite SOA applications, plus IOD initiatives touching IMS. Links IMS to other clients *(e.g. DB2, CICS, etc.)*, enables Java IMS development, provides direct IMS access from other z subsystems, and stores direct XML content in IMS.
33. **IBM Content Management V8.4 family:** IBM Enterprise Content Management *(ECM)* offerings now have improved performance, scalability, and usability, via new family releases of:
    - **IBM DB2 Content Manager for z/OS V8.4:** IBM strategic and open content management platform. *(December 14th, 2007.)*
    - **IBM Document Manager V8.4:** Manages compound business document s over their lifecycle. *(December 14th, 2007.)*
    - **IBM Content Manager OnDemand for z/OS V8.4:** Leading enterprise reports management *(ERM)* solution. *(V8.4 – TBA V8.3 – September 30th, 2004.)*
    - **IBM WebSphere Information Integrator Content Edition V8.4:** IBM's real-time, unstructured content integrator; interconnects leading content management repositories. *(December 18th, 2007.)*
    - **IBM CommonStore V8.4:** Controls e-mail/e-message store size, and helps ensure compliance. *(November 30th, 2007.)*
    - **IBM WEBi V1.02:** Intuitive, Web2.0-style browser tool eases direct user access to content, ERM output.

    IBM is again *(with FileNet)* the clear Content Management *(CM)* market leader, and these advances will fuel further mainframe-centered CM growth.

34. **IBM DB2 Content Manager Leverages FileNet:** Flagship IBM DB2 Content Manager V8.4 now also integrates powerful IBM FileNet Records Crawler *(automatically seeks documents to set rules, processes them, and captures file systems)* and FileNet BPM *(improves process performance, cuts cycle times, and improves productivity, by automating content-centric BPM)*. *(Points 26 to 34 are covered in Section 6.)*

35. **IBM's 25 ISV Acquisitions for IOD:** IBM's now-extensive IOD portfolio's rapid built-out was hugely aided by its 25 ISV acquisitions/integrations in 2001-2008, costing c. $10B, including $5B paid for Cognos alone. These were:

- **Cognos.**
- **Princeton Softech.**
- **DataMirror.**
- **FileNet.**
- **Webify Solutions.**
- **Solid Information Technology.**
- **Unicorn.**
- **LAS.**
- **Bowstreet.**
- **iPhrase.**
- **DataPower.**
- **Green Pasture Software, Inc.**
- **DWL.**
- **PureEdge Solutions.**
- **Ascential.**
- **SRD.**
- **Venetica.**
- **CrossAccess Corporation.**
- **Alphablox.**
- **Trigo Technologies.**
- **Tarian Software.**
- **Access360.**
- **TrelliSoft.**
- **Informix.**

Brief details of each acquisition, and its contribution to IBM's IOD portfolio, are given in Appendix A, Figure A1.

36. **Powerful IBM DB2 & IMS Tool Portfolios Enhanced:** IBM now offers extensive DB tools portfolios that extensively support both these premier System z data servers:

- **DB2:** Now comprises 49 tools, all supporting DB2 for z/OS V9 now.
- **IMS:** Now comprises 46 tools, all supporting IMS V10.

The tools are all shown in charts B1 and B2 in Appendix B.

37. **Numerous Other IOD Advances:** Beyond the major IOD new products above, numerous other powerful and innovative new, offerings also joined the IBM IOD portfolio. These included:

- **IBM WebSphere Metadata Server *(for Linux on System z)*:** New IBM Information Server module – industry's first unified repository architecture for data integration, delivers "metadata management as a service" over the IBM IOD portfolio.
- **WebSphere Business Glossary for Linux on System z:** New IBM Information Server module, offers a Web-based UI to create, manage, organize, and share, controlled enterprise terms vocabulary, & data classification system. Aids information retrieval via a shared common language.
- **IBM Metadata Workbench:** New IBM Information Server module, adds powerful, Web-based metadata visualization, navigation, and management, visually showing relationships among data sources and data users.
- **IBM DB2 Warehouse Performance Management Suite:** Comprehensive DW performance monitoring, optimization, and management for IBM InfoSphere Warehouse V9.5 users. Helps better deploy, manage, support, tune, & scale-up, dynamic DW environments for fast growth.
- **IBM OmniFind Analytics Edition:** IBM InfoSphere Warehouse component, this research-based software provides advanced content analytics and mining to analyze unstructured information, returning deeper, real-time, new business insight value.
- **IBM DB2 Balanced Warehouse Extended Portfolio:** IBM's extended/enhanced set of pre-configured, pre-packaged, and pre-tested, dynamic data warehousing software- and hardware-bundled solutions. Inclusive, end-to-end scope makes these faster, easier & cheaper to deploy than custom DWs.
- **IBM InfoSphere Warehouse with Optim Data Retention:** New solution integrates IBM InfoSphere Warehouse with Optim Data Retention *(recent Princeton Softech-buy)* archiving & retention software. Better manages DW data over its lifecycle, optimizes performance, and ensures compliance. Extracts/archives complete business objects under policy control.
- **IBM WebSphere Product Center:** New release to enhance IBM's fast-expanding MDM family in summer 2008. Strategically leverages product information in product-centric industries, like retail, distribution, CPG, and consumer electronics, for improved sales, marketing, and channels support.
- **IBM FileNet P8 4.0:** February 2007 release of flagship FileNet *(strategic, $1.6B IBM IOD buy)* product that captures, manages, accesses, and consolidates all forms of unstructured content, and enables usage in critical business processes.

These other significant, impressive, IBM IOD product offerings are each more deeply reviewed in Appendix C.

# 2. IBM's Information on Demand – Thriving on its Second Birthday

## IOD Introduced

**IOD**, this White Paper's focus, is IBM's ambitious grand vision and strategy to deliver for its customers a radically stronger, more all-embracing, new generation of enterprise information management solutions. IBM has designed and developed these solutions to deliver accurate, consistent information, as-and-when needed *(On Demand)* across the whole enterprise and its business ecosystem. These solutions operate across structured data and unstructured content, under an open-standards-based, SOA-supportive software architecture *(the term "Information as a Service" was sometimes used earlier to describe this aspect of IOD at launch, denoting the close linkage to SOA)*.

IBM's broad goals of IOD were to optimize, integrate, virtualize, and accelerate enterprise-wide access to, and to enable the fast delivery of, **trusted, reliable, and accurate information** within its correct business context, to all "consumer" applications, business processes, and people across the enterprise and its ecosystem. The name **"Information on Demand"** reflected these diverse, and now often dynamic, real-time information needs that must now be met by automatically delivering "Information as a Service" on an enterprise-wide basis, and with stringent QoS and security levels *(rather than through the hundreds of piecemeal approaches used in most firms today)*.

IOD was introduced and visualized with graphic charts like Figure 2, showing the span and high ambition IBM held for its major software and services strategy for enterprise data/information management for the mid-to-late 2000 decade.

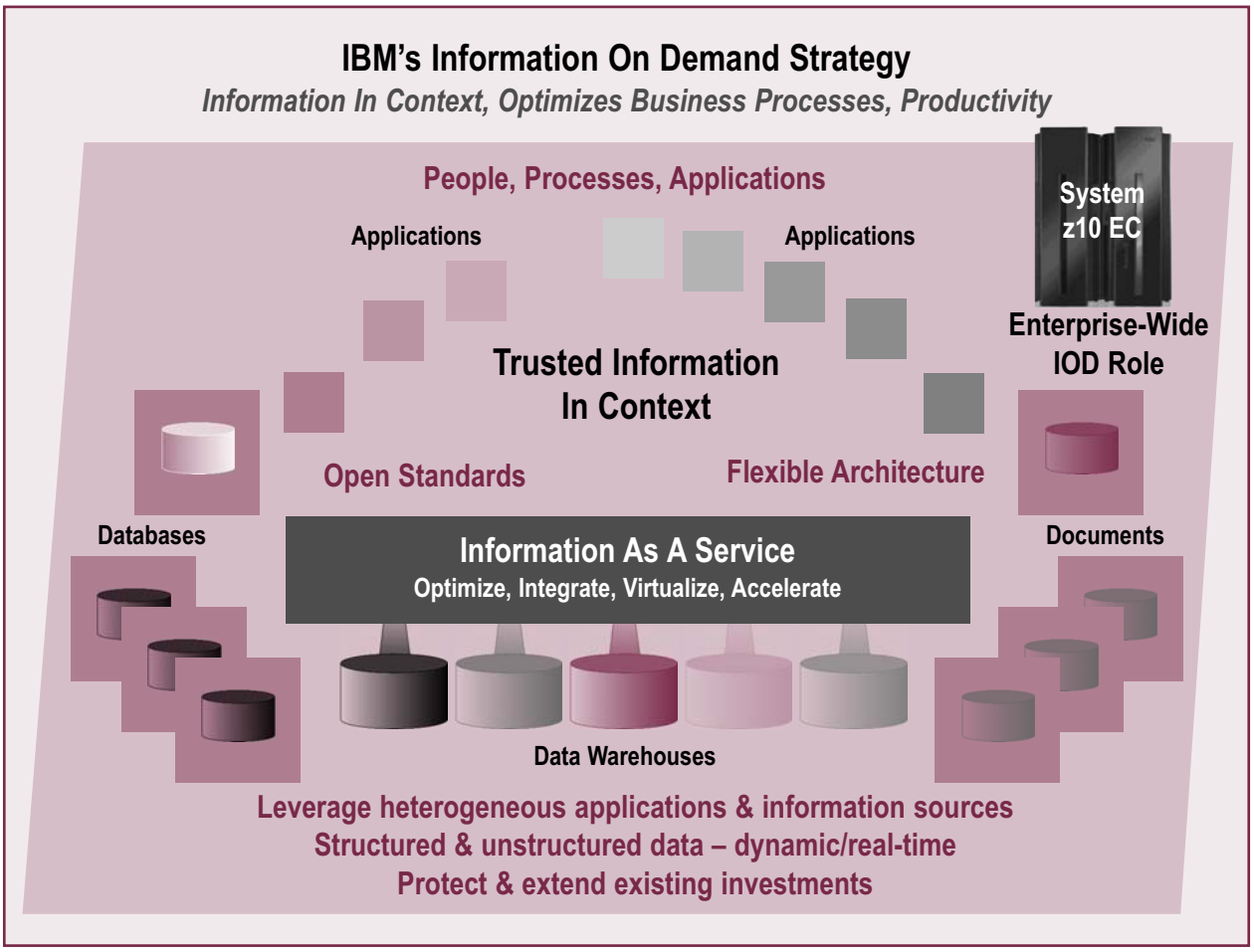


**Figure 2: IBM's IOD Strategy – Information in Context, Optimizes Business Processes and Productivity**

The lower part of Figure 2 depicts the many diverse databases of structured data, the content repositories of unstructured content information, the aggregated DWs and datamarts, and the enterprise applications that comprise the main current enterprise information sources used today in every larger- and medium-sized company.

Most enterprises have evolved to date running highly diverse and heterogeneous data sources, on multiple software and hardware platforms. To meet IBM's extraordinarily ambitious IOD goals, a highly-flexible IOD architecture, rooted in open industry standards, and able to support burgeoning new SOA application architectures, was rightly specified by IBM as a central "must-have" IOD attribute. The unique, enterprise-wide IOD role proposed for the System z mainframe is symbolized top-right, and is the focus of much of this White Paper's coverage.

*This truly impressive, genuinely visionary, IOD strategy was first publicly announced in February 2006, when the initial IOD product and service offerings began shipping.*

This truly impressive, genuinely visionary, IOD strategy was first publicly announced in February 2006, when the initial IOD product and service offerings began shipping. This original IOD announcement combined and integrated, existing IBM Information Management product sets *(data servers, information integration, data management tools, etc.)* with strategic additions brought in and integrated from a major string of IOD-supportive ISV acquisitions. IBM's IOD portfolio was also extended/developed by a massive, multi-year, IBM internal R&D-driven development program. These efforts cost many $B in combined IOD investments made.

IBM Software Group's highly-successful Information Management brand organization, long a data server and IM software leader *(against Oracle, Microsoft, and Sybase, et al)*, has been owner, developer and driver of the IOD effort *(aided and supported by the IBM STG hardware, IGS services, and IGF financing units)*. The Information Management brand has enjoyed sharply accelerating software revenue growth as a result of these winning IOD innovations and acquisitions, the acid test of their success.

## The Business Need for IOD

Today's faster business pace, and tougher competition, is forcing organizations to sharply improve their core business processes, and to better integrate their people, processes, and information more closely together. Many also need to interconnect their systems with their collaborative partners, suppliers and channels ecosystem. These closely linked business and IT changes are vital to increase enterprise flexibility/responsiveness, grow top-line revenues, whilst reducing costs and slimming wasteful processes for bottom-line gains. Many have called this "On Demand business", and its central application solution enabler is SOA.

Most enterprises are also flooded with data, reports, spreadsheets, paper-based documents, e-mails, and instant messages. Where much of this information is stored at all, it is stored in manual or paper-based file systems, locked up in operational systems, hidden on employees' disk drives, or scattered across multiple repositories. The principal business needs for IOD are stringent, wide-ranging and diverse, and these include:

- **Enabling Real-time, Global Data Access:** Empowering all staff with real-time information, all the time, wherever they are, and whatever role/function they are performing.
- **Providing Flexibility & Diversity:** Creating a dynamic IT and information management environment that can keep up with, or stay ahead of, the faster speed/pace at which modern business moves today.
- **Lifting Efficiency & Productivity:** Lowering costs by maximizing information team productivity, and by raising information infrastructure efficiency.
- **Ensuring Security & Compliance:** Automating the implementation and demonstration/validation of security and governance policies.

Without a unified, trusted view of customer, product and account information, staff continually search for *(and re-create)* the same information. This leads to multiple views of critical business information being created and propagated, often riddled with inaccuracies and errors. This increases business costs, reduces effectiveness, and it makes it increasingly difficult for the business to respond adequately or well to the widespread pressures they face today, including:

- **Improving customer service.**
- **Optimizing operations.**
- **Increasing agility and competitiveness.**
- **Complying with regulations.**

## Major February 2008 IOD Announcements Crown Second Birthday

In the just two years that have now elapsed since IOD was introduced, IBM made numerous additional **IOD offering portfolio advances**, completed many more large and smaller acquisitions, and achieved significant customer IOD adoption milestones. Most recently, its major January/February 2008 IOD announcements included the closure of **IBM's largest-ever acquisition; that of leading independent BI ISV Cognos for $5B**.

*This crowning step in the development of IBM's IOD strategy...*

This crowning step in the development of IBM's IOD strategy has now made an extensive raft of integrated/combined IBM-Cognos 8 offerings available, tightly integrating the industry's leading enterprise BI and performance management suite into IBM's IOD framework and portfolio foundation. *(Whilst pledging to continue the prior close support for heterogeneous BI tools, and close partnerships with their vendors, that both IBM & Cognos had long actively embraced)*. We assess and evaluate these crucial developments from a System z perspective, in Section 4.

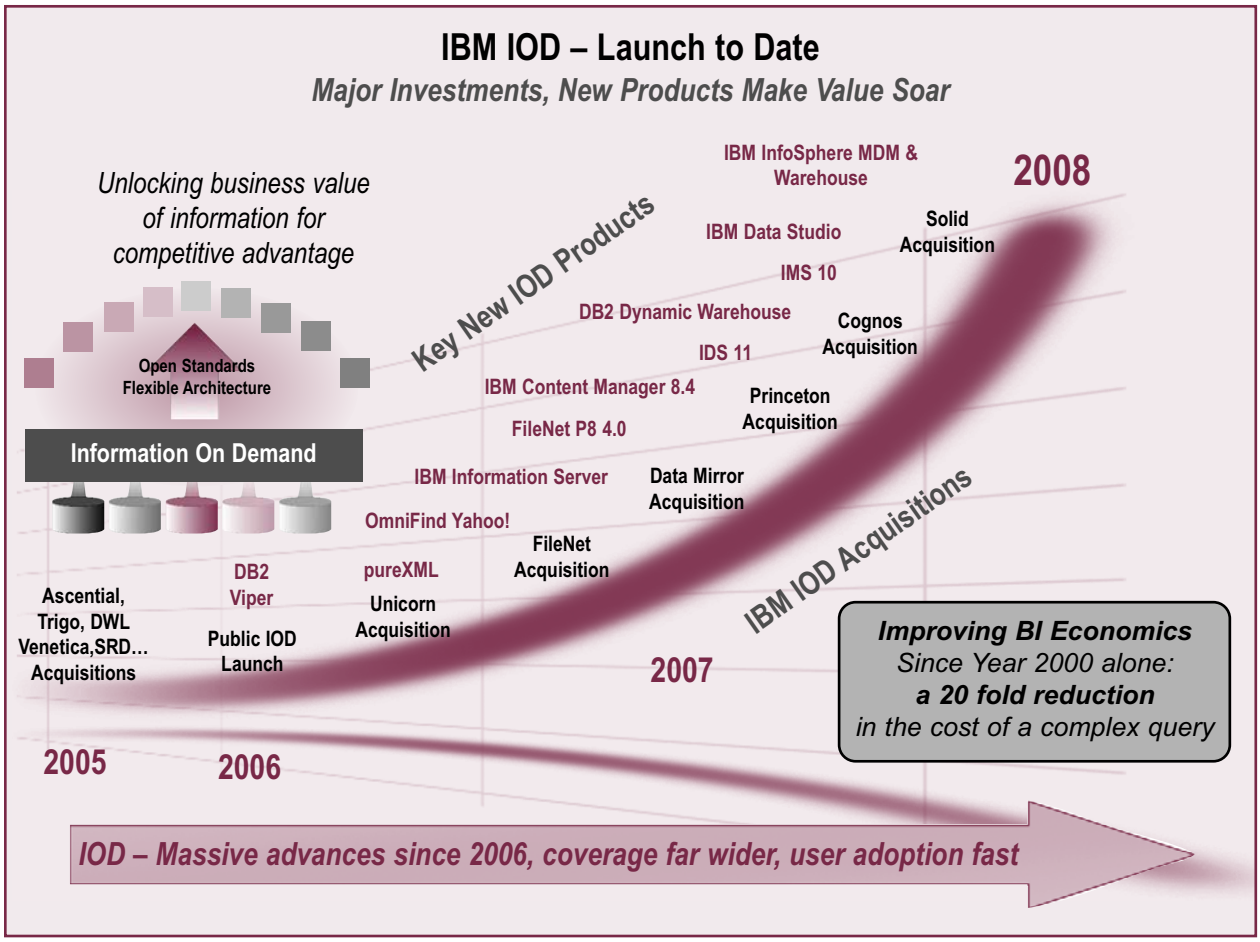


**Figure 3: IBM's IOD Launch to Date – Major Investments, New Products Make Value Soar**

Figure 3 provides a visual timeline and summary of many of IBM's late-2005 to 2008-to-date ISV firm acquisitions in support of IOD, and of IBM's new IOD product announcements, just in the two years since the strategy's public debut. The impressively broad span of software ISV/product and technology acquisitions, plus massive in-house development, delivered this strong slate of new, information management, technology-leadership-enhanced products, many of which we assess later in this White Paper. The chart also highlights the staggering reduction in the costs of performing complex data query analysis computations *(one key aspect of IOD)* that have fallen by more than 20-fold since the beginning of the 2000-decade. Continually improving hardware and software price-performance delivered over this time period now enables a far wider range and number, of larger BI queries and analyses, to be delivered per unit of compute power used/cost.

*Continually improving hardware and software price-performance delivered over this time period now enables a far wider range and number, of larger BI queries and analyses, to be delivered per unit of compute power used/cost.*

We published one of the first, and most in-depth *(74 pages!)*, analyst assessments of IOD *(and the System z mainframe's IOD role)* in January 2006 *(see page 61, item 6 for details)*. With such extensive IBM IOD developments/advances seen over the subsequent two years, this new 2008 White Paper now hopefully provides a timely extension/update.

## IOD Mirrors, Supports IBM's Leadership SOA Suite Offerings

SOA is, without question, the most important applications architecture in IT industry history. It now provides the increasingly universal, open-standards-based, business application platform that can finally integrate the many diverse application components customers have already implemented, and can enable them to transform their business processes faster. For over three years, IBM has successfully driven, and delivered on, its hugely ambitious SOA strategy that leveraged all parts of IBM's business. It created, and has now widely deployed, the industry's strongest SOA portfolio of enterprise middleware *(the IBM SOA Foundation)* and development tools, methods and models, accelerators, industry business components/services, and an extensive gamut of IBM SOA professional services, and enlisted a wide range of SOA partners. These enabled IBM to now command a dominant number-one market-share position in SOA, and to work with customers on over 5,500 SOA engagements to date. IBM's sweeping IOD initiative, which equally combines many elements of its software, research and consulting portfolios, tightly complements, and is now a major enabler of, the giant IT vendor's equally ambitious SOA initiative. Our other System z research included two in-depth Reports *(published November 2005 and January 2007)* on IBM's SOA strategy from a mainframe viewpoint *(see page 61, items 3 & 7)*. These provided our comprehensive evaluations of the IBM SOA-System z combination, and we include select summary research findings here from this research.

## IOD Portfolio Complete Q1 2008?

After IBM's hyperactive IOD-related acquisition and development program *(summarized in Figure 3, and all its acquisitions detailed fully in Appendix A)*, Q1 2008 sees the large majority of IBM's planned IOD portfolio and strategy essentially completed, and its comprehensive coverage now mostly in place. Our densely-packed Figure 4 shows the three central IOD capability areas in the center of the chart as graphic elements, including the newest BI major addition at the top, supporting from **business automation** functions at the bottom, through up to the **business optimization** functions at the top. The main roles of each of these three capability areas are shown next to each graphic on the left-hand-side of the chart. The main business optimization areas are also shown top center below the chart heading.

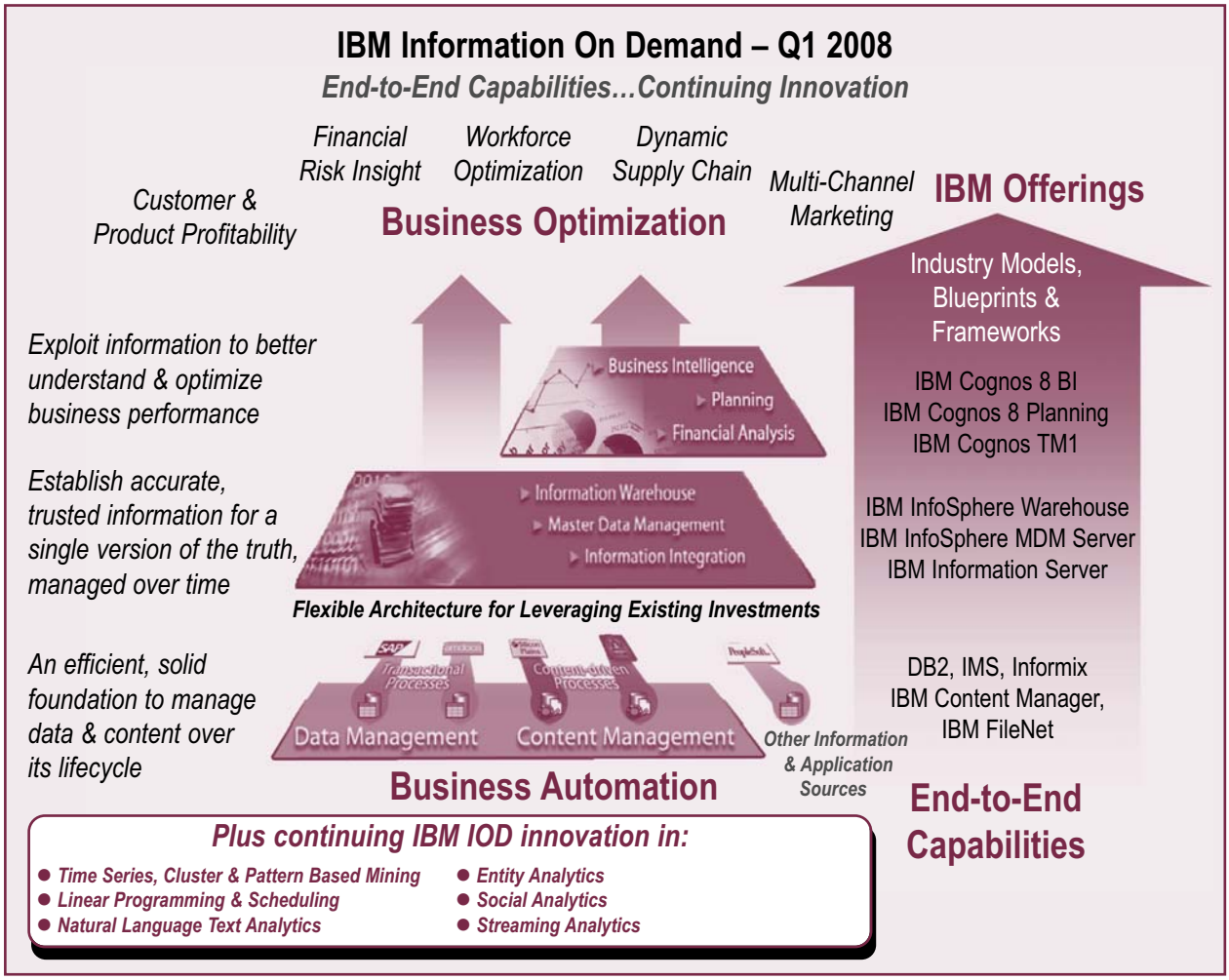


**Figure 4: IBM IOD 2008 – End-to-end Capabilities… Continuing Innovation**

The vertical arrow to the right shows the main groups of IBM IOD product offerings, each group enabling one of the three main IOD capability areas alongside in the center.

- At the bottom, these are the **IBM data server** *(including DB2 and IMS on System z)* **and ECM** products *(including IBM Content Manager and FileNet)*.
- In the center are the **IBM information integration** *(the IBM Information Server)*, **data warehousing** *(the IBM InfoSphere Warehouse)* and **MDM** *(the IBM InfoSphere MDM Server products)* that draw upon and aggregate/cleanse/correlate enterprise information from the data servers and other data sources layer above.
- At the top are the latest **BI** and **EPM** offerings *(including IBM-Cognos 8 BI, IBM-Cognos 8 Planning, and IBM-Cognos TM1)* from the Cognos acquisition. These leading-edge BI/EPM tools and dashboards are fed and powered from the advanced, middle-layer, "added-value" IBM IOD solutions above.

With recent IOD announcements, essentially all the main elements of IBM's IOD vision and strategy have now been brought together, integrated and announced. The principal additional or enhanced supporting products that deliver IOD are either already out, or are becoming available from Q1 2008-on, depending upon hardware/OS platform. This is a deeply-impressive, comprehensive, and stunningly-rapid IOD evolution. Today, it already provides what is unquestionably now by far the world's premier IOD software portfolio, solutions and services offering from any vendor, and a hugely important foundation and enabler for SOA. Whilst new additions and many future enhancements are to be expected, the scope, shape, coverage, and components of IOD are now clear, here, and rapidly winning adoption.

## How IOD Supports BI – A Layered Architecture View

Another useful way to visualize, understand and explain IBM's IOD strategy and offerings portfolio is from a layered software architecture viewpoint. This places the principal IOD product groups within their respective layers, and highlighting the broad integration between the layers to show how these support the vital, upper-layer BI/EPM functions. Figure 5 presents this important view.

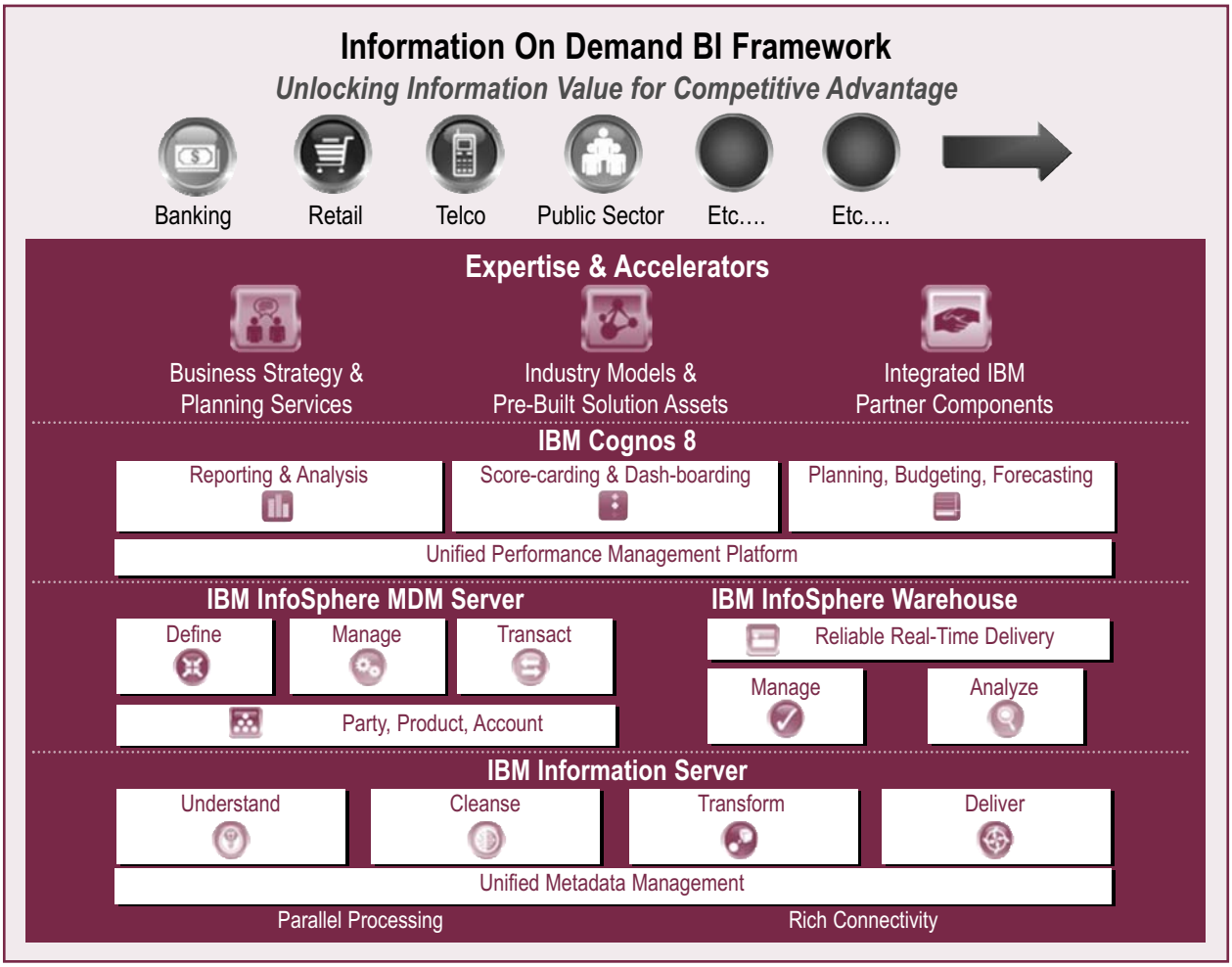


**Figure 5: IOD BI Framework – Unlocking Information Value for Competitive Advantage**

At the top of the chart, we show symbols for diverse vertical industries, indicating that an important part of IBM's IOD vision is to provide industry-specific data models, to support industry-specific data standards, and to offer pre-built, industry-specific components. These combine to help greatly speed and simplify IOD implementation within each supported vertical sector. The industries covered include banking, retail, telecommunications, and public services, etc. *(shown by central symbols in the top architecture layer under "Expertise and Accelerators")*.

These are one major form of IOD "Expertise and Accelerators" that are all shown in the top layer of the IOD architecture, the other two being high-level Business Strategy and Planning Services from IBM's consulting organization, and Integrated IBM IOD Partner Components from the now-substantial IOD partners ecosystem that is growing rapidly.

The next highest layer of the IOD architecture is now termed IBM's Unified Performance Management Platform, now provided by the fully-integrated IBM-Cognos 8 BI/EPM platform that delivers advanced:

- **Reporting and Analysis.**
- **Score-carding and Dash-boarding.**
- **Planning, Budgeting & Forecasting.**

We evaluate and assess these new, Cognos-acquisition-based BI/EPM offerings for IOD in Section 4, from a System z mainframe viewpoint.

Supporting this BI/EPM layer are the new triumvirate of the three principal, new, IBM IOD servers that now comprise the IBM Information Platform of IOD, viz.:

- **IBM InfoSphere MDM Server:** Which now provides unified capabilities to define, manage and conduct transactions enterprise wide with consistent master data for products, customer party, and accounts, etc., all within a common MDM server.
- **IBM InfoSphere Warehouse:** Which now delivers and manages reliable real-time information delivery from multiple, cleansed, transformed, and thus accurate DW source feeds, and enables all types of BI/EPM analysis as above.
- **IBM Information Server:** Highly-sophisticated, unified, enterprise information integration, definition, transformation, cleansing, and information delivery server that connects all the underlying enterprise data sources, and builds and feed DWs, BI and EPM.

We evaluate and assess these central new IOD servers, and the complementary, unified IBM metadata management capabilities that support them, from a System z mainframe viewpoint, in Section 5.

Not shown explicitly on Figure 5, we also evaluate and assess the IOD foundation IBM data server and content management offerings, from a System z mainframe viewpoint, in Section 6.

## IOD and the System z Mainframe

For most large enterprises, the IBM System z mainframe today continues to play a central, and now often strongly-increasing, role at the heart of their IT infrastructures. These unique, highly-virtualized, ultra-efficient, highly-manageable/productive, and outstandingly high QoS systems host/support many of the largest and most mission-critical enterprise applications, now host many new workload applications, and manage 80% of global enterprises' machine-readable data.

The mainframe was long optimized to make it the industry's most robust and efficient enterprise data-server platform, with its legendary DB2 and IMS software supporting that role, and with new, lower-cost mainframe economics enabling wider usage. The latter includes not only the sharply-improved price/performance provided by mainframe hardware and software innovations this decade, but also includes Linux-only IFL specialty processors and systems, and the zIIP *(System z Integrated Information Processor)* specialty processor engine for lower-cost DB2, networks and XML workloads processing on the mainframe.

To position our IOD analysis in the correct System z context, Section 3 assesses the mainframe platform's progress through 2007, and its outlook for 2008 with the new-generation System z10, based our other extensive mainframe research. *(See page 61, all items.)*

## An Information Agenda for IOD

IBM proposes that customers adopting IOD should develop and apply an "Information Agenda" to guide and illuminate their efforts to unlock the full business value of information across their enterprise. It proposes that such Information Agendas should consist of four main elements:

- **An Information Strategy:** Creating a vision to guide decisions and to help the enterprise decide how to best to support business goals with superior information.
- **Robust Information Infrastructure:** Identifying and acquiring the information management technology components & capabilities that are required to establish a common information framework.

- **Information Governance:** Implementing policies & practices for managing, using, improving & protecting organizational information.
- **Information Roadmap:** Establishing a realistic plan to execute discrete projects that realize short- and long-term returns on investment towards the information strategy goals.

Few would disagree that such a structure is desirable, but we expect wide diversity in Information Agendas that emerge from different customers and segments. Every enterprise has undoubtedly implemented a slightly unique mixture of information management initiatives of its own already over the last decade, so their starting points *(or baselines)* for their new Information Agendas will differ quite widely. The critical business issues that determine an enterprise information agenda's strategic priorities will also be widely different depending on the current business imperatives in that sector. Here, IBM Global Business Services industry information models, industry information solutions, and industry best practice experience can add great value in helping customers refine their strategic directions.

## About this White Paper

This new White Paper is one of three, new, complementary, Q1 2008-published, Software Strategies System z mainframe software studies *(others mentioned in the Abstract on page 2)*. It reviews and recaps IBM's IOD strategy's evolution since its 2006 launch, and analyzes the latest *(February 2008)* highly-significant major developments announced in depth, from a System z mainframe user perspective.

## Who Should Read this White Paper?

This White Paper was written for CIOs, CTOs, and senior IT/DP managers in enterprises using IBM mainframes today, who are already using, or are planning to deploy, IBM's IOD strategy across their enterprise. These, and other executives and managers needing to unlock the business value of their enterprise's whole information for competitive advantage, will hopefully find the Paper helpful, thought-provoking, and the source of answers to many of the questions that naturally arise on early exposure to the IOD message.

## Our Analysis

The widespread absence of trusted information – information that is completely accurate, timely and relevant – remains a "front-of-mind" issue for CEOs and senior executives around the world. The cost and complexity of managing increasing volumes of data and content, combined with the universal needs for IT to now be able to provide trusted information to every user for every transaction, is driving CIOs to a more radical, newer approach to information delivery. IBM's IOD strategy and portfolio were specifically designed, developed, refined, and packaged, to fully enable and support such unified, trusted, in-context, enterprise-wide information delivery services that could feed and complement new generation SOA business applications and processes.

IOD allows a radical shift away from traditional, siloed, organizational information fiefdoms, and towards the design and deployment of an enterprise-wide information infrastructure that can enable consistent information delivery for every staff role, task, and business process.

IBM made giant strides over the just two years that have elapsed since its IOD launch. It has completed the build-out of, and has fully delivered on, and has even extended, its whole IOD vision and strategy, with a major sweep of advanced, new and enhanced, open-standards-based products that now/will soon cover all the main IOD layers and functions envisioned.

As Figure 3 on page 14 *(and Appendix A)* details, IBM made many IOD acquisitions, and delivered numerous important new and enhanced IOD products, methods and services offerings, over its first two years on the market. The rate and scale of these IBM IOD innovations and developments, fuelled by its many acquisitions, has continued at a phenomenal rate over the past two years. We estimate that IBM must have invested a staggering, near-$15B in IOD and its underlying information management developments over the last five years, an extraordinary commitment even for the IT giant. These impressive IOD advances now increasingly enable the System z mainframe to deliver a high-value, new role/function, that of delivering IOD across the whole enterprise as its "IOD-central" hub. IOD is also closely complementary to, and a important enabler for, SOA, where IBM has already won a commanding number-one market-share-lead through over 5,500 SOA engagements to date.

*The rate and scale of these IBM IOD innovations and developments, fuelled by its many acquisitions, has continued at a phenomenal rate over the past two years.*

User adoption of IOD's base layers of data serving, ECM, and some degrees of information integration and ETL/ETT services, is widespread already, and had been for some time. The adoption of new IOD middle ***("Information Platform")*** and upper layer ***("BI and EPM")*** software services is accelerating rapidly. This is where we expect to see the highest/fastest adoption/growth rates over the next five years, as users seek to unlock and deliver the full IOD benefits now obtainable.

These benefits are compelling, and now include:

- **Enabling transformation of core processes**, by enabling free information flow across the enterprise and extracting/delivering rich, new insights from information already held.
- **Understanding and serving customers better**, by discovering new and innovative ways to approach the market and deliver services, products and value to targeted groups.
- **Increasing productivity**, by rapidly delivering the right information needed and when needed, to improve decision making with less manual research and information collation/analysis.
- **Streamlining regulatory compliance**, by more effectively managing information over the course of its whole lifetime, and by demonstrating how full compliance has been maintained.
- **Providing real-time, trusted information**, about clients and products, etc., enabling a quicker and better organizational response to changing market conditions, opportunities, threats, and risks.
- **Implementing real-time, multi-channel marketing**, together with real-time risk management, real-time merchandising, and other time-sensitive industry initiatives that are essential in the On Demand business era.

Competitively, IBM's IOD software stack and related accelerators provide it and its customers with considerable market differentiation and competitive advantage in the marketplace, because no other enterprise ISV can offer a directly-comparable, functionally-equivalent IOD offering of the breadth, depth, sophistication, technology, and open standard support, of IBM's IOD portfolio. Nearest rival here is its old "database-wars enemy", but enterprise applications partner/friend, Oracle Corporation. With its complete IOD stack now delivered, IBM has pulled strongly ahead of Oracle in this broader and wider IOD vision of the information management market that spans far beyond database servers. Oracle has been working feverishly to extend its Oracle Fusion middleware stack, most recently with its major acquisition of BEA Systems, where it seeks to complete head-on with IBM's SOA stack. However, IBM has, we judge, now carved itself a real lead over Oracle with its impressive IOD portfolio and supporting IPR now available.

*With its complete IOD stack now delivered, IBM has pulled strongly ahead of Oracle in this broader and wider IOD vision of the information management market...*

Whilst many additional IOD advances can be expected in future years, IBM's original vision can now be truly said to have been mostly realized, with all the main needed products, and the accelerators/expertise/services that complement them, all here or near.

# 3. Dramatic System z Mainframe Success in 2000 Decade

## Total Transformation + New Workloads = Strong System z Market Resurgence

*A massive, sustained, several $B of IBM investment/innovation effort totally transformed the platform's technology, economics, hardware capacity/capability, openness, and software stack...*

The IBM mainframe underwent total, top-to-bottom transformation from 1993 to date, with nine new generations released, six of the S/390 CMOS G series, and three of the post-2000, 64-bit z/Architecture System z, over that time. Now from February 26th, 2008, the stunning z6-chip-powered, next-generation System z10 EC high-end mainframes will ship, further extending the platform's impressive advances. A massive, sustained, several $B of IBM investment/innovation effort totally transformed the platform's technology, economics, hardware capacity/capability, openness, and software stack, to attain the outstanding leadership QoS capabilities IBM mainframes now offer today.

## Strong 2000-Decade Mainframe Resurgence Continues Apace – Capacity Tripled

This decade-long IBM transformation *(of the now 43-year-established mainframe)* first triggered market revival, then full-on market resurgence, over this 2000-decade. Revival began with the z Series z900 *(2000)* and z800 *(2002)*, and accelerated into resurgence with the z990 *(2003)* and z890 *(2004)*. It strengthened further with high-end System z9 109s *(Q3 2005)* and with System z9 Business Class *(z9 BC)* and System z9 Enterprise Class *(z9 EC)* machines *(both July 2006)*. IBM's Mainframe Charter *(2003)* publicly pledged rapid and continued innovation, value, and ecosystem development advances to customers. These pledges IBM has amply delivered upon. The mainframe won back wide-margin market-share leadership *(in high-end servers)*, saw installed capacity soar, and its user base first stabilize and to now again expand *(around 15,000 systems and 10,000 customers at end-2007)*, recapturing renewed, industry-wide esteem.

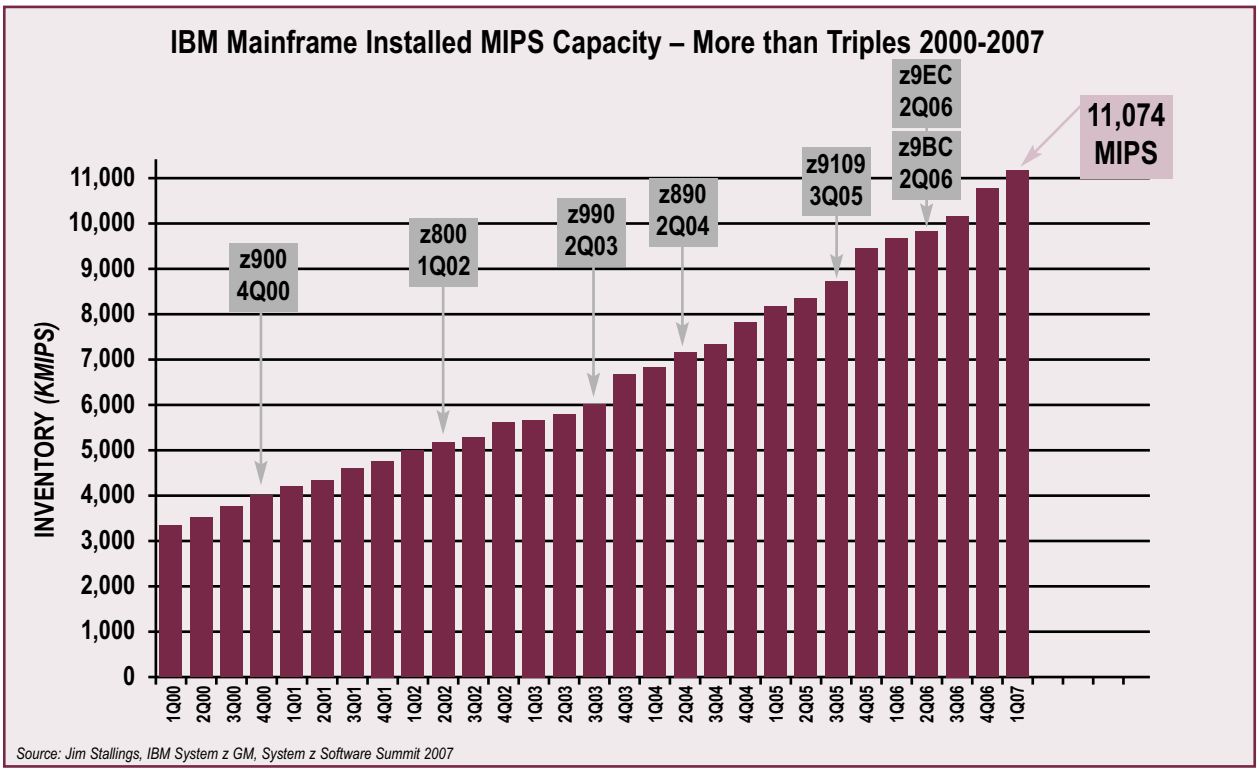


**Figure 6: IBM Mainframe Installed MIPS Capacity – More than Tripled 2000-2007**

Striking resurgence evidence was the soaring global installed mainframe MIPS, as indicated in Figure 6. Aggregate MIPS installed worldwide rocketed from c 3.4M *(Q1 2000)* to c. 11.1M *(Q1 2007)*, more than tripling *(X3.3)* over these seven years.

Now, the newest mainframe generation, led by the impressive System z10 EC high-end systems *(profiled below)* which became available on February 26th, 2008, looks set to further extend the mainframe's resurgent growth.

## New Mainframe Workloads Drove Mainframe Resurgence

Fast growing, new-to-mainframe workloads *(shown in Figure 7 on page 21)* that included Linux applications, Java EE™ applications, DB2 data serving, SOA, Enterprise Resource Planning *(ERP)*/CRM package applications, distributed server consolidation to Linux-on-z/VM, and BI/DW, were the prime resurgence drivers. These new workloads devoured well over 60% of all post-2000 mainframe MIPS sold.

IT professionals long recognized IBM mainframes for their legendary commercial transaction *(CICS/COBOL and IMS, etc.)* and batch workload processing capabilities. For these, the mainframe's refined, optimized, and balanced system architecture, and huge I/O capacity, long provided superb performance, reliability, availability, security, and high throughput/utilization.

However the modern System z mainframe also proved itself an ideal, fully virtualized, highly-automated platform to run these fast-growing, new workloads that often need to be closely integrated with traditional applications. Today's mainframe is the pre-eminent, heavy-duty, commercial business application serving and data serving *(transactional and batch, traditional and new workloads)* platform, best meeting demanding I/O bandwidth and fast response-time requirements. The platform now scales over a vast capacity range, to support needs from those of medium firms, up to those of the largest global enterprise.

These new mainframe workloads normally all run on a customer's well-utilized, shared, single System z mainframe, and require today's now-extensive IBM Tivoli system management software portfolio to deliver the platform's exceptional QoS.

## Specialty Engine Processors Economically Enabled New System z Workloads

Important enablers of this mainframe resurgence, with healthy MIPS installed capacity growth driven by burgeoning, new-to-System z-workloads growth, have been the successful System z specialty processor engines. Four types of these were introduced in turn on System z since the late 1990s. Qualifying workloads for each specialty engine type are automatically redirected onto those processors, and thus do not consume standard System z CP MIPS.

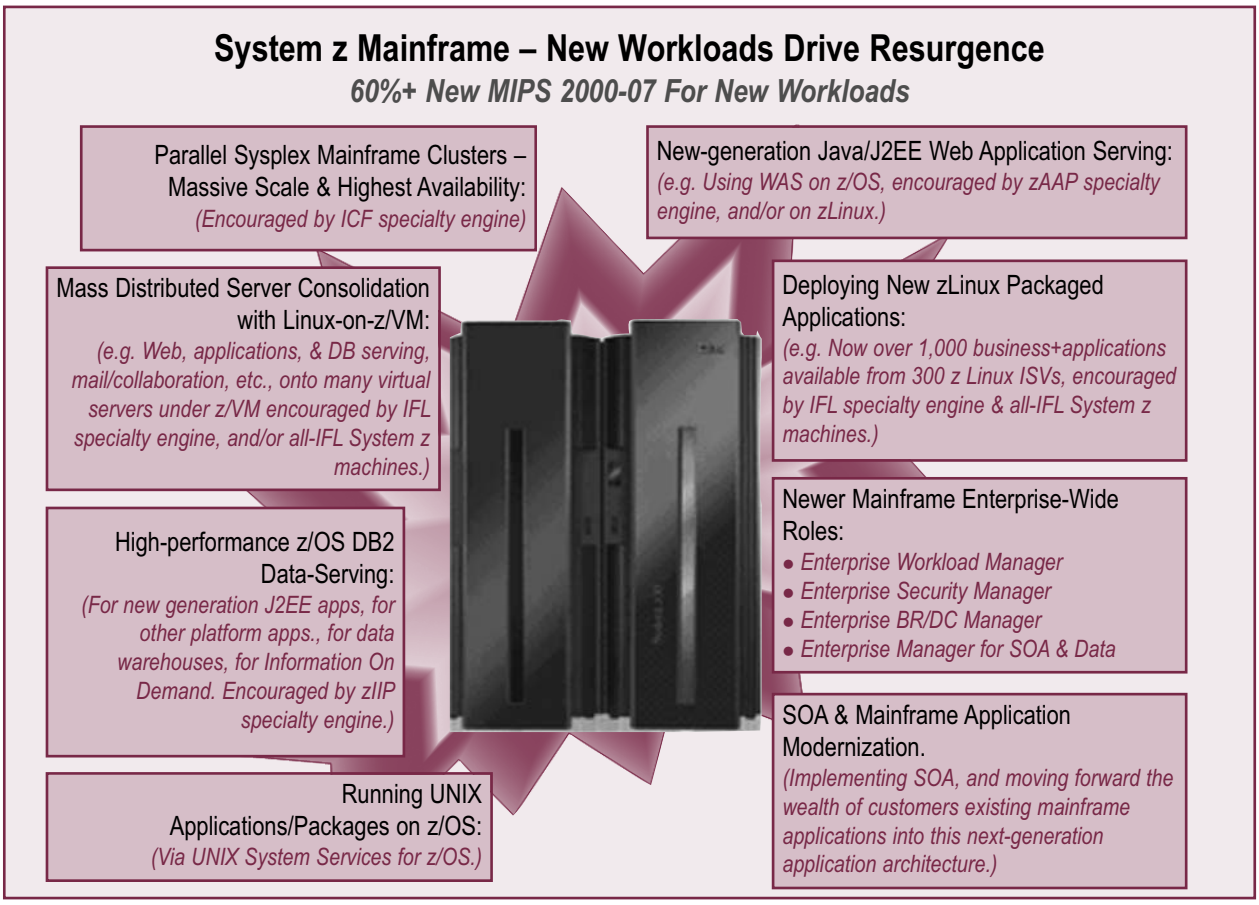


**Figure 7: System z Mainframe – New Workloads Drive Resurgence**

- **ICF – Integrated Coupling Facility *(1997)*:** Specialty processor engines for running System z Parallel Sysplex cluster coupling workloads in multiple System z Sysplex, and GDPS, cluster configurations.
- **IFL – Integrated Facility for Linux *(2000)*:** Specialty processor engines for running mainframe Linux, either "on the metal" in an LPAR, or under the z/VM extreme virtualization hypervisor. IFL MIPS installed have grown 70% CAGR since their 2000 introduction.
- **zAAP – System z Application Assist Processor *(2003)*:** Specialty processor engine for running Java EE™ workloads, notably WebSphere Application Server, and related Java work. Now *(2008)* also extended to also run XML Systems Services *(on System z10 and z/OS V1.7+)*. zAAP MIPS installed have grown 91% CAGR since their 2003 introduction.
- **zIIP – System z Integrated Information Processor *(2005-06)*:** Specialty processor engines, originally offered to run three common, select DB2 database workload functions. In autumn 2007, the zIIPs role was extended to support network encryption. Now *(2008)* its role has been extended again to also run XML parsing, and remote data mirroring with System z Global Mirror *(On System z10)*. zIIP MIPS installed grew 159% CAGR since their 2006 introduction.

Specialty engines are charged at far lower *(as little as a quarter of standard CP)* fixed prices *($95K on z9 BC, $125K on z9 EC for IFL, zAAP, & zIIP, the latter the same on the new z10 EC)* for their full capacity *(<580 MIPS on z9 EC, <940 MIPS on z10 EC)*. Importantly, they also attract no System z system capacity-related software charges. All-IFL System z mainframes *(up to any capacity)* may be ordered for Linux-only workloads use. These mainframes are ultra-competitive for major enterprise Linux applications, Linux application and database serving, and for mass hosting several hundred Linux virtual server workloads migrated across from wasteful, inefficient, distributed servers.

At end-Q1 2007, IBM reported c. 1.7M MIPS of mainframe processing capacity had been installed over all four specialty engine types, around 15% of total MIPS, and growing much faster than the overall mainframe base. 1.2M were IFL MIPS running Linux, just over 100,000 were zAAP MIPS for Java, and just under 100,000 were zIIP MIPS for DB2. The now near-seven-year-available IFL option for Linux has been hugely successful, and the newer zIIP is off to a fast start.

## Extended Enterprise-wide Mainframe Roles

Whilst engineering/optimizing System z to excellently run the new-to-mainframe workloads mentioned previously onboard the mainframe itself, IBM has also determinedly pursued a related strategic direction. This was to position, define, and to fully develop/equip the System z mainframe to take on completely new, enterprise-wide roles. It implemented this strategy methodically, carefully, and by multiple steps, to extend/expand unique mainframe QoS capabilities/strengths, so the platform could truly deliver new added value across the whole IT infrastructure, in each new enterprise-wide role created. Each role was selected as deeply in need of major improvement at larger enterprises, where typically over-complex, multi-platform IT infrastructures had hitherto precluded solutions, and indeed often had created the problems that are needful of such solutions today.

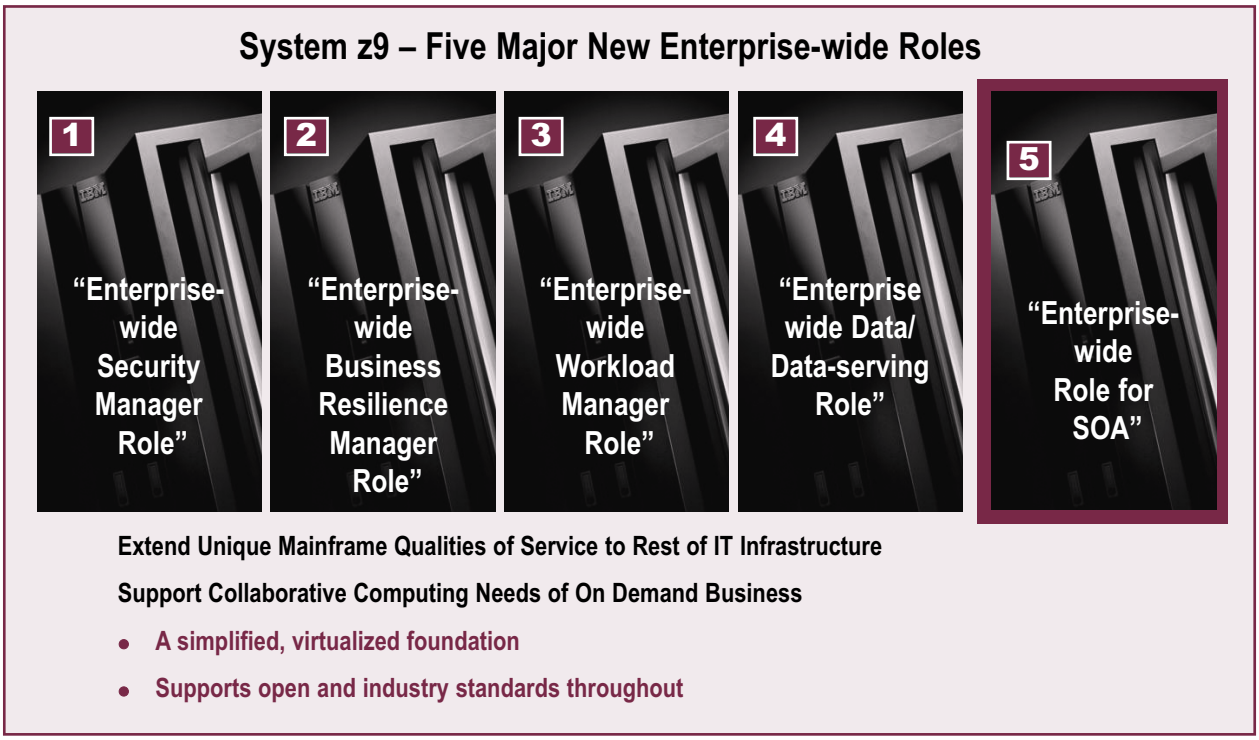


**Figure 8: System z9 – Five Major Enterprise-wide Roles**

The first five enterprise-wide roles targeted under this strategy to date are shown in Figure 8; others may be added or will evolve. Readers will appreciate how already-deep mainframe strengths/goodness *(in each of these areas)* would bring substantial extra business value when extended to other platforms/whole infrastructures as well. For the past three years, IBM has innovated, developed and delivered scores of additional new System z hardware, software and tooling capabilities which now provide increasingly comprehensive System z support for each of these important new roles. These new enterprise-wide roles also become new mainframe workloads, consuming mainframe MIPS/capacity in return for their added-value benefits; naturally one of IBM's goals here.

Amplifying one example illustrates this continuing major effort. The new "Enterprise-wide role for Data" above includes, but also now greatly extends, the heavyweight DB2 *(and IMS DB)* traditional mainframe data-serving capability long provided to other client applications/platforms from these host subsystems. Now, System z also provides extensive additional support to off-mainframe client applications running on other platforms, and for XML data as well as relational data *(with DB2 V9 "Viper" for z/OS)*. This now exploits the zIIP specialty processor engine for DB2 workloads, to make System z data serving across the enterprise for other client applications highly cost-effective. System z also now hosts *(on z Linux)* **the impressive new IBM Information Server** enterprise data integration and transformation software that is an essential foundation of IOD enterprise-wide, a vital, complementary, SOA-enabling, enterprise-wide information management service.

We discuss the advanced SOA and system management mainframe *(combines roles 1-3 from Figure 8)* enterprise-wide roles in more detail in our other two, new, companion mainframe software advances-focused White Papers, the former already out, the latter to be published in Q1 2008. See also the System z SOA subsection below.

## System z Now Often Lowest-cost, Always-greenest, Enterprise IT Platform

Capacity/throughput doubled for each previous System z mainframe generation, and has now jumped by another 70% on the z6-MPU-powered, new System z10 EC high-end mainframe generation discussed below and shipping from February 26th, 2008. Sharp hardware cost reductions averaging 20% per prior generation, and software cost drops averaging 17% p.a. since 1997, plus many other cost improvements, combined to yield c. 20% total mainframe price/performance gains per year. Adding to these large mainframe economic advances were:

- **Superb virtualization and automated workload management** *(that enables up to nearly 100% utilization of capacity)*.
- **Full slate of Capacity on Demand *(CoD)* options** *(for greatest customer flexibility to meet varying workload needs)*.
- **Highest levels of system automation** *(that has slashed support staff needs, now multi-fold lower than on all distributed platforms, and much lower than on pre-2000 mainframes)*.
- **Smallest data center footprint, lowest power and cooling costs** *(per enterprise workload and/or per 1000 users, all three now large, fast-rising IT costs)*.

*These factors make the mainframe the leanest and greenest of enterprise IT platforms per workload metric, allowing huge savings...*

Today's System z mainframes deliver the lowest TCO/TCU/Cost-Per-Transaction *(CPT)* for medium/large mixed commercial workloads *(both traditional and new – the latter now including extreme virtual server hosting)*, when well utilized. Far higher resource utilization, combined with lower software license, support staffing, electrical power and cooling needed, and much lower data center floorspace costs are the main sources of 30-50% lower TCO that System z solutions now deliver versus comparable capacity distributed system alternatives. These factors make the mainframe the leanest and greenest of enterprise IT platforms per workload metric, allowing huge savings *(electrical power, cooling energy, and data center floor space)*.

## System z9 Mainframe Generation Advances Extended Success

IBM drove a heavy drumbeat of major advances in mainframe server and storage hardware, economics, operating, and middleware and tools software for the last two years with its prior System z9 generation. We deeply assessed these in several Papers/Reports *(see page 61 for details)*, and recap their highlights here as:

- **System z9 BC:** Entry-midrange, ideal for medium business, from only $100K, at 26-1,786 MIPS capacity. *(Succeeded z890 system.)* Continues through 2008 as the mid-range mainframe offering.
- **System z9 EC:** High-end systems, ideal for larger enterprises, 5 models, <54-Way CP, <17,800 MIPS capacity. *(Succeeded z9 109, & prior generation z990.)* Now succeeded by System z10 EC.
- **Industry-first 4Gbps FICON I/O support**, for higher I/O performance/capacity on all z9s.
- **New zIIP:** New specialty processor for low-cost DB2 data serving, on all z9s.
- **Unique "Hybrid Processor" Architecture:** Combines standard CPs, the specialty workload processors IFL *(Linux)*, zIIPs *(DB2)*, zAAPs *(Java)*, and ICFs *(Sysplex cluster coupling)*, spare PUs, System Assist PU's *(I/O)*, mass I/O channel MPUs, plus crypto MPUs. These create unique "commercial supercomputers" of huge *(up to 416 processors total)*, cost-effective capacity in a small footprint.
- **Superb Virtualization/Automated Workload Management:** Enabling near-100% capacity/resource utilization across multiple, mixed workloads, traditional and new.
- **Fullest CoD Options:** For maximum flexibility so that customers can rapidly meet their varying workload peaks.
- **New Enterprise-wide Roles for Mainframe:** Extensive, additional support delivered apace for five new roles.
- **Leadership Mainframe Storage:** IBM's winning storage portfolio was fully refreshed *(August 2006 and again in early 2008)* with leadership DS8300/DS8100 Turbo high-end, and DS6000 mid-range, disk systems, and numerous other enterprise storage virtualization and System z Disaster Recovery *(DR)*/Business Continuity *(BC)* and Sysplex software gains, all optimized for use with the System z mainframe platform.
- **Major Base Middleware Advances:** The System z's comprehensive middleware software subsystems, including: DB2, IMS, CICS, WAS, WebSphere MQ, NetView, IBM Systems Director, and Tivoli, etc., *(plus their associated tooling/support software)* made further unprecedented advances through 2006 and 2007, focused on J2EE™, open standards/Web services and SOA support.
- **Leanest, Greenest IT Platform:** Far the greenest IT solution, smallest data center footprint, lowest power and cooling costs per 1,000 users, per virtual server, per workload, etc. *(Versus distributed servers of equivalent capacity.)*

This System z9 generation was highly successful in the marketplace from late 2005 on, further extending the platform's resurgence, installed base capacity, and footprints. Only late in 2007 did System z9 sales dip, as usual when next-generation mainframes were due, and now have arrived.

## Next-generation System z10 EC Mainframe – February 2008 Debut, Massive Further Advance

The next-generation System z10 EC high-end mainframes *(five-model range)* were announced on, and shipped from, February 26th, 2008, with an impressive specification, and a long list of major advances over their System z9 EC predecessors. IBM had also previously showed off *(to system analysts – including this author)* full details of the storming new IBM z6 quad-core MPU *(and related SMP Hub)* chips that power these new System z10 mainframes. These now offer:

- **Spectacular New IBM z6 MPUs Powers System z10:** Massively powerful, 4.4 GHz. ultra-high frequency, quad-core z6 System z MPU chips each packing 991M transistors *(and running at 2.59-times higher frequency than the 1.7 GHz. z9 EC MPU chips that delivered 580 MIPS/core)*. The high-end z6 chip in the System z10 EC delivers close to 940 MIPS/core, we estimate.
- **Massive Bandwidth:** Each z6 chip provides 2*48 GB/s links to new **SMP Hub** chips *(see below)*, 4*13 GB/s links to memory, and 2*17 GB/s links to I/O, for a massive 182GB/s total chip bandwidth.
- **Continues System z CISC MPU Line:** The z6 MPU *(and the System z10 line)* continues the tradition of System z "extreme-CISC ISA". It sports an 894-instruction ISA *(50 new in the z6, 668 implemented all-in hardware)*, and offers the usual, full-backwards-compatibility for all mainframe software, addressing modes, and supported operating systems.
- **Close Sibling to POWER 6:** As the "z6" name implies, the System z10's z6 MPU is a close sibling *(but far from an identical twin)* sharing semiconductor technology *(IBM 65 n.m. SOI process)*, considerable DNA, and some on-die components, with the POWER 6. IBM's high-performance, dual-core, high-frequency POWER 6 RISC MPU powers IBM's shipping System p, System i & some BladeCenter servers. However, contrary to widespread convergence rumors, the two processors remain entirely different, each optimized for their different roles, whilst exploiting the above commonalties.
- **z6 Optimized for Mainframe Roles:** The z6 MPU is heavily optimized for mainframe enterprise applications, data-serving, and extreme virtualization consolidator, roles, and those are shown in Figures 3 & 4 *(on pages 14 & 15 respectively)*. It includes established on-die virtualization, cryptographic acceleration, and data compression hardware support, adding on-chip Decimal Floating Point *(DFP)* arithmetic *("money math")* the latter over 10X faster than utilising DFP via software.
- **SMP Hub Companion Chip:** Massive new 1.6B transistor **SMP Hub** companion chip. These connect to multiple IBM z6 MPU chips with 48GB/s bandwidth per processor, giving access to 24MB of shared L3 SRAM cache/SMP Hub, or 48MB of shared L3 SRAM when Hubs are paired. Low-latency cache coherence, robust SMP scaling, and extended SMP scaling when multiple SMB Hub chip/pairs are used, are the compelling major benefits that IBM claims for its new System z10 mainframe system design which exploits these SMP Hub chips.
- **Industry's Most Extensive RAS:** The z6 MPU again incorporates far the industry's highest level of on-chip RAS features that are the hardware underpinnings to deliver the highest levels of inbuilt error-checking and recovery of any commercial server that these mainframes again provide.
- **Value Improvements at Current Capacity Points:** The new generation z6-MPU-powered, System z10 EC mainframes need fewer cores, fewer z6 chips *(quad-core)*, fewer MCMs, and fewer books, for each given capacity level, enabling improved value.
- **Higher Top-end System z10 EC Capacity:** Top-end System z10 EC capacity increased by 70%, within a near-identical, physical footprint, over the z9 EC. Faster cores on z6 chips, new SMP Hub chips with new star L2 cache interconnect, increased SMP scaling *(from current maximum 54 CP/64 PU total – z9 EC S54)* up to the new 64 CP/77 PU total *(z10 EC E64)* drove this. Maximum memory is also tripled to 1.5TB, and much faster 6.0GB/s InfinBand interconnects replace the previous 2.7GB/s IBM STI proprietary interconnects.

*...this major mainframe generation advance will spark strong System z10 sales/upgrades throughout 2008 and 2009.*

- **c. $1B New Mainframe Generation Investment:** Complete new mainframe generations each typically need a $1B+/- IBM hardware/software investment. That IBM has once again made such a large investment, right on time, is therefore a good indicator of its high confidence in the business/revenue growth outlook for its flagship server platform.
- **Extended "Extreme Virtualization" Capability:** Top-end, new-generation System z10 mainframes can now practically run at least 500-800 significant-sized Linux-on-z/VM virtual servers *(versus 250-400 on z9 EC)*, encouraging further, faster, mass-distributed server workload consolidation.

Clearly, this major mainframe generation advance will spark strong System z10 sales/upgrades throughout 2008 and 2009.

## System z Mainframe – Top SOA Applications Platform

SOA is without question the most important application software architecture advance in our industry's history. It has rightly enjoyed soaring customer adoption for the last three years. System z mainframes already host several $1Ts-worth *(and up to 43-years)* of business-critical applications assets, and 90% of the world's largest commercial databases, for over 10,000 customer enterprises. These z-resident application and data assets are the crucial basis for SOA enhancement/extension/reuse and new exploitation. Today's System z mainframes, combined with the now-outstanding, comprehensive, and industry-leading IBM SOA Foundation for System z middleware/tools software, offers an unequalled, enterprise SOA hosting environment. Several thousand mainframe users have already based their firm's SOA adoption upon their System z, and on this IBM SOA Foundation software. The combination provides the ideal enterprise "SOA Central" host for their new, mission-critical business processes and the new SOA applications supporting them, providing unique System z platform QoS that are essential for these vital, high-transaction-volume, core business solutions.

## IBM Information Management Software and System z

IBM invented the Relational Database Management System *(RDBMS)*, and has been one of the foremost and largest Information Management *(IM)* software vendors for many years, with the DB2 RDBMS perhaps its best-known manifestation and the bedrock IM foundation on the System z mainframe. The "Information Management" software brand is one of the largest and longest established pillars of Big Blue's now c. $20B sales and strongly growing – 10% revenue increase – *(FY 2007)* IBM Software Group middleware software and tools business.

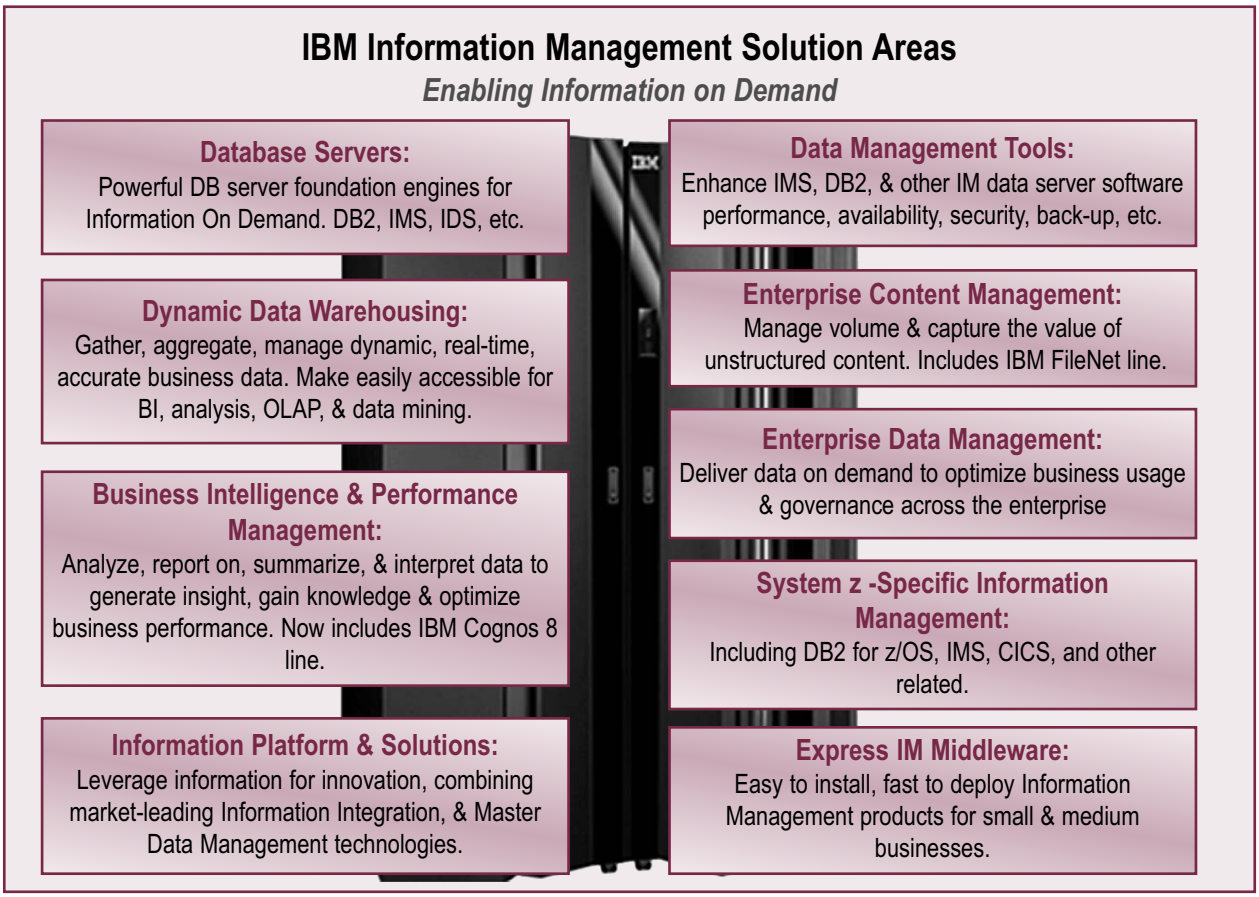


**Figure 9: IBM Information Management Solution Areas – Enabling IOD**

Figure 9 shows the full span of the IBM Information Management portfolio that now delivers IOD, highlighting and briefly introducing the main segments/categories of products it offers, some long-established and familiar, and others the innovative newcomers that have recently enabled IOD. This chart portrays a slightly System z platform-focused viewpoint of IM segment/category coverage, because the mainframe remains the longest running, and a hugely important revenue platform again for IBM IM software, but also because System z is our interest in this White Paper. It should, however, be stated that the comprehensive, multi-platform support offered by IBM's IM portfolio, and indeed for IOD as well, that encompasses both other IBM system platforms, and the major competitor system platforms, remains a major advantage and strength of the offering set from a customer viewpoint.

## New IBM & ISV Software to System z Migration Pattern

The strong resurgence of the System z mainframe has also established a steadily-growing wave of modern, advanced software, from numerous large-leading, as well as small-specialized, ISV's, being ported to the System z platform, greatly extending the breadth, depth, and currency of the z software portfolio now available. In addition, IBM massively increased and accelerated the rate of its own advances and developments of all its long-established and newer mainframe subsystems, middleware servers, and tools. These major efforts brought IBM's mainframe portfolio up to what we rated as a "far-the-best ever" start-of-2008 status.

A "to-the-mainframe" software migration pattern is now quite well established. Knowing this pattern will help readers seeking to understand which of the wide-ranging IOD offerings reviewed/assessed in this White Paper are, will be, or may in future become, available on the System z mainframe platform, and if so, in what forms.

1. IBM now runs an annual, well-established cycle of System z software releases, linked to its annual September release of each successive new version of the flagship z/OS mainframe operating system *(z/OS V1.10 in September 2008)*. IBM, and many of leading z/OS software ISV's, now therefore synchronize their own new product version releases with, or just after, these z/OS releases each year, to ensure their offerings exploit the latest IBM OS and z hardware offerings. Yearly Fall SHARE mainframe user conferences are often the venue for announcement of these.
2. New z/OS operating system releases support/exploit new, advanced hardware features incorporated in the approximately two-yearly new System z mainframe hardware generations, such as the recently introduced new System z10 EC high-end line. Sometimes, these software features are also back-fitted to earlier z/OS releases, so that customers on those z/OS releases can benefit at once from new hardware features without a forced OS upgrade.
3. Porting a new software application or middleware product to the z/OS environment is a more demanding, time-consuming, and stringent process than for most other cross-platform software ports. This is because of the unique z Architecture software environment, and because of the stringent rules/standards that must be applied in core mainframe software. High efforts are also needed to make software fully exploit the advanced QoS capabilities of the z/OS environment. In addition, much more stringent testing/quality validation *(taking more testing time)* is needed to ensure the software behaves to the mission-critical, enterprise-class standards expected of z/OS software. It thus takes both IBM and other ISVs somewhat longer to bring out z/OS versions of new software. New z/OS products, or major versions, usually ship some 6-months elapsed time behind first release on their lead platform.
4. For much of the last decade, most new classes/types of enterprise applications software, middleware, and software tools were *(for obvious business reasons)* first developed for the distributed server platforms popular over that period *(UNIX initially, later Windows, now also Linux)*.
5. The widespread success of Linux on the System z mainframe has greatly speeded the pace of migration, and broadened the portfolio of, software applications, middleware, and tools available on System z. Moving an existing Linux application to System z Linux in a "compliant" form is a relatively simple, quick port. A "fully mainframe QoS exploitative" z Linux port obviously takes longer. It was also relatively easy to move many UNIX applications onto Linux on System z. These facts meant in practice that new software technologies, products and versions shipped for distributed UNIX and/or Linux platforms are now often shipping at the same time, or very soon after, for Linux on System z. Some of these later migrate to the mainstream, production z/OS environment, where this makes sense, as above.

Readers will note this pattern at work as we review and discuss the IOD product categories, product offerings, and their System z mainframe availability, integration, and/or interoperations in Sections 4, 5, and 6.

## Our Analysis

The IBM System z mainframe enters 2008 in excellent health with the new System z10 generation now launched, having enjoyed a swelling resurgence, and successfully attracting huge and growing quantities of new-to-mainframe workloads onto the platform this decade. The pace and breadth of mainframe innovation and advancement across all layers of its hardware and software, fuelled by massive ongoing IBM investments, far exceeded that of other major platforms. This process sharply swung relative competitive platform advantage sharply back in favor of the far-more-efficient, shared resource, centralized, "all-in-one-box" IBM mainframe computing model. Increasingly, enterprise users must now escape from their legacy scale-out distributed computing infrastructures, fashionable a decade ago, but now widely despised as a profligate, wasteful, and unmanageable enterprise IT platform option.

*This process sharply swung relative competitive platform advantage sharply back in favor of the far-more-efficient, shared resource, centralized, "all-in-one-box" IBM mainframe computing model.*

Specialty processor engines made System z attractive and cost-effective for customers valuing efficient, lean-and-green, centralized computing, to bring their target major new workloads onto mainframes. These are also an important part of today's mainframe's hybrid-processor, "commercial-supercomputer" model. This blends/combines a number of types of optimized, dedicated processors to handle massive, overall mainframe workloads.

The previous System z9 *(9th CMOS mainframe)* generation proved highly successful for IBM since its 2005 first debut. These systems greatly extended mainframe capacity and capability across the board, further sharply improved their economics, won thousands of enlarged base footprints, and added hundreds of all-new customers to the base. They also supported and fully exploited the richer, deeper System z software infrastructure of subsystems, middleware and tools that now includes the industry's strongest SOA stack *(our recent assessment)*.

Enterprise IT user adoption of **SOA** itself exploded rapidly from 2005-2007, and is fast becoming the universal business applications software architecture, with the mainframe serving as an "SOA Central" for most. These large SOA adopters now heavily use their IBM mainframes to host enterprise-wide SOA applications that exploit, reuse, extend and modernize their wealth of mainframe application software/database assets. Managing, monitoring, securing, and optimizing these more complex, new, mainframe-based and SOA technology-enabled, critical business processes has thus become vitally important.

*The new generation of System z10 EC mainframes, powered by the spectacular, new, IBM z6-quad-core MPU, just became available on launch (February 26th, 2008)...*

The new generation of System z10 EC mainframes, powered by the spectacular, new, IBM z6-quad-core MPU, just became available on launch *(February 26th, 2008)* bringing radical further advances in mainframe capacity and scaling, business value, and green IT advantages. These new mainframes are certain to further accelerate the already substantial market and workloads "swing-back" to this ultra-virtualized, extraordinarily-efficient platform.

The System z ecosystem of business partners, software ISVs and mainframe software products, SIs and SPs has continued to expand, and is growing again in a healthy fashion in line with platform resurgence, aided by continued IBM ecosystem building investments.

The mainframe has long been pre-eminent as the enterprise data server, and has also often been favored host for enterprise data warehousing, and ECM, initiatives as well. Now, with IBM's extensive IOD strategy and portfolio, and the continuing developments of the mainframe platform *(and its associated storage)* and software, the System z mainframe is certain to play a still stronger, more central role in delivering IOD across the enterprise. Recent developments in these crucial areas are the focus of this White Paper.

# 4. IBM Cognos Buy, Integration, & February 2008 IOD Announcement

## Introduction – 2007 Saw BI/EPM Market Transformation

BI remains a top 2008 priority for CIOs, and EPM is a top priority for CFOs, driving the need for common platforms that can improve overall enterprise performance. Companies demand solutions that provide a single, trusted view of their business to drive real-time strategic and operational intelligence to a wide range of internal and external users. The older, static BI/EPM approaches of batch data warehousing, and retrospective historical-data-based query, reporting and analysis are no longer adequate in the far-more dynamic, faster-moving On Demand business world.

Until Q1 2008 IBM had foresworn itself to not supplying its own BI and EPM products; a large, long-established, and still healthy growth software market it had long left to independent third-party BI/EPM vendors. *(These included SAS, Cognos, Business Objects, Hyperion Solutions, MicroStrategy, IBI, and others)*. IBM was a close partner to several of these BI/EPM vendors, some for up to three decades. In such partnerships, IBM provided its extensive IM data server, data warehousing, information integration, and other IOD middleware software, to underpin and feed the BI/EPM vendors' tools, and IBM IGS consulting services often delivered customer solution implementation services. In fact, this BI/EPM software tools market had remained one of few large software segments still dominated by mid-sized, specialist ISV firms, most with more than 20 years standing, rather than by the top five software industry giants who now so dominate most other segments.

Two of IBM's largest software competitors *(who are also "co-opetition" partners)* each splashed out for major acquisitions of leading BI/EPM tool vendors in rapid succession last year, in moves that rapidly reshaped the BI/EPM market. First off the starting block was highly acquisitive Oracle Corporation. Oracle paid $3.3B cash *(a 21% premium)* to close its April 2007 buy of Hyperion Solutions Corporation, the leading financial reporting/budgeting EPM software specialist *(2,700 staff, $765M prior FY revenue)*, seen by many analysts as a blow against Oracle's deadly rival SAP. *(Many users ran their Hyperion software against their SAP applications.)*

Next up, SAP itself, the global ERP applications leader and Oracle's deadliest applications nemesis, splashed out on its own largest-ever acquisition. It inked a friendly, $7.1B *(18% premium)* purchase of BI/ERP major Business Objects, which it closed in mid-January 2008. This SAP purchase brought Business Objects' $1.51B revenues *(up 20%)*, around 5,500 staff, and a claimed 45,000 customers *(all CY 2007 data)* into SAP, soon followed by the rapid roll-out of integrated SAP-Business Objects offerings.

## IBM's $5B Cognos Acquisition Accelerates IOD Growth, Portfolio Coverage

In part spurred by these competitor moves, but more by its much-avowed intent to rapidly complete the build-out of its own impressive, burgeoning IOD strategy, vision, and products/solutions portfolio *(launched in February 2006)*, IBM next made its own seminal BI/EPM move.

November 2007 saw IBM announce its $5.0B all-cash acquisition *(9% premium)* of long-time BI/EPM major Cognos, Canada's largest software company, which closed on February 4th, 2008, and was **IBM's largest-ever acquisition in its long history**. This Cognos buy brought 4,000 worldwide employees, more than 25,000 customers, over 3,000 business partners, and c. $1.0B of FY 2007 Cognos revenues, into the IBM IOD fold. Cognos was rapidly integrated as a new group within IBM Software's IM division, to remain focused on BI/EPM, a smooth and rapid take-on for the reasons highlighted below. Prior Cognos President/CEO Rob Ashe was appointed to lead this new IBM unit, reporting to IBM IM General Manager Ambuj Goyal. IBM pledged to the Canadian Government that it would keep Cognos' operations and employees in Canada, to ensure the deal brought net benefits to that country, and won all approvals. This major Cognos buy was IBM's 23rd acquisition in support of IOD *(fuller details of all 25 are given in our Appendix A analysis)*.

*November 2007 saw IBM announce its $5.0B all-cash acquisition (9% premium) of long-time BI/EPM major Cognos, Canada's largest software company...*

IBM and Cognos had partnered closely together for more than 15 years, and had already developed extensive technical integrations between the Cognos 8 BI/EPM platform and solutions portfolio, and IBM's IOD foundation middleware and tools. Cognos also had a strong history of supporting heterogeneous application environments, a stance totally consistent with IBM's similar multi-platform approach. Even before this acquisition, the duo was already offering eight pre-integrated, joint solutions, and was supporting many hundreds of mutual enterprise customers. These included the New York City Police Department, Blue Cross and Blue Shield of Tennessee, Canadian Tire, MetLife, and Bayer UK.

*"IBM has been providing Business Intelligence foundation solutions for decades. Our broad set of capabilities – from data warehousing to information integration and analytics – together with the Cognos portfolio, position us well for the changing Business Intelligence and Performance Management industry. We chose Cognos because of its industry-leading technology that is based on open standards, which perfectly complements IBM's SOA and IOD strategies," said Steve Mills, Senior Vice President and Group Executive, IBM Software Group.*

IBM now claims that, with Cognos, it has become the industry's leading provider of technology, products, solutions, and services for BI and EPM. It states that it is now delivering the most complete, open standards-based BI/EPM platform, with the broadest range of expertise, to help companies expand the value of their information, optimize their business processes, and maximize performance across their enterprises. Although these are bold and wide-ranging claims, our assessment is that they are actually well merited, relatively accurate statements of objective market fact today.

*In our assessment... this was a tremendous IBM acquisition coup, near-completely complementary, and with almost no product overlap, secured at a moderate price.*

In our assessment *(as an analyst who spent an earlier 15 career years deep in the BI tools market!)* this was a tremendous IBM acquisition coup, near-completely complementary, and with almost no product overlap, secured at a moderate price. There was already an outstandingly close fit between the two party's software offerings, and a well-oiled, joint sales machine was already cranking out many wins together, even before this deal. The world-class Cognos 8 BI and EPM platform, tools, and solutions were already well respected, leading technology, open-SOA-standards-based offerings, and will undoubtedly further extend these real strengths under IBM's committed and IOD-passionate ownership/investment.

The much wider reach and range of IBM's sales, support, and service organizations will now also provide broader reach for Cognos solutions across multiple industries and geographies, enabling a more complete set of offerings, including consulting services, hardware, and other middleware software *(see the subsection below)*. With the addition of Cognos, more than 35,000 employees across IBM's global software, hardware, services and research organizations, are now united to support its global IOD strategy.

## February 6th, 2008 IBM-Cognos-centered IOD Announcement Overview

Reflecting the already close integration established between the IBM and Cognos software platform offering, and between their respective sales/marketing/service operations, just two days after the acquisition closed, on February 6th, 2008, IBM made its most recent, major IOD announcement. This revealed IBM's full business strategy for the Cognos acquisition, and introduced an impressive sweep of new, IBM-Cognos-based product integrations, industry solutions, and IOD services offerings, outlined in Figure 10 below. IBM claimed that these would enable all sizes of organizations to gain better insights from their data, improve their decision-making, and optimize business performance.

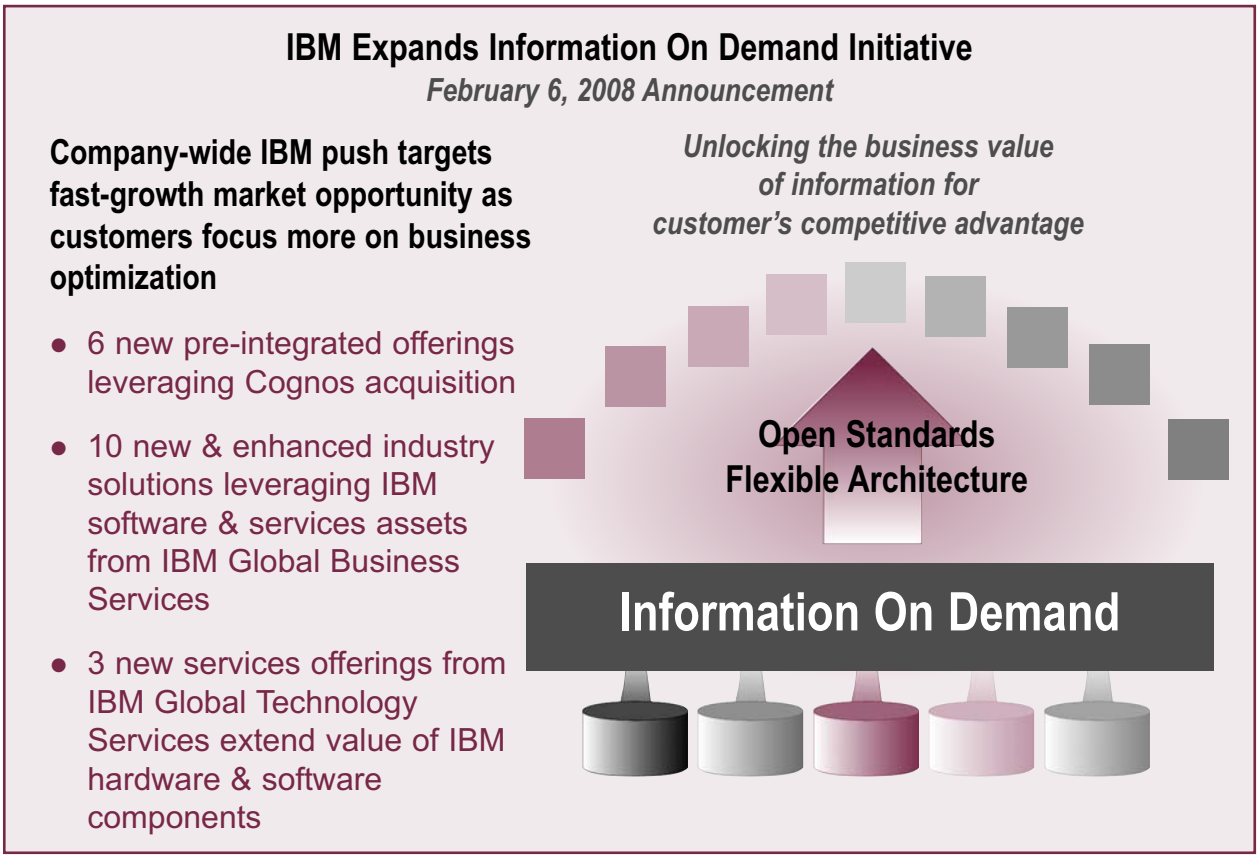


**Figure 10: IBM Expands IOD Initiative – February 6th, 2008 IOD Announcement**

The three main elements of this important IOD announcement are each assessed in the following subsections.

## Six New, Pre-integrated IBM-Cognos Product Offerings

In addition to immediately adding all the existing Cognos products, platforms and offerings onto the IBM IOD catalog, IBM-Cognos announced six new, pre-integrated IBM-Cognos product offerings. These bundled and combined their existing software to make the new range easier to configure and buy, and offering better value, for customers, *(and naturally also easier and faster for IBM-Cognos to sell)*.

These new offerings, designed to enable companies to more readily use BI to improve overall business performance, are shown/positioned in Figure 11 *(on page 30)*, and each assessed below:

- Bundling **Cognos 8 BI "Starter Pack" with IBM InfoSphere Warehouse**, and distribution of the **IBM InfoSphere Warehouse** *(limited license)* **with Cognos 8 BI** solutions. These packaging moves make it easier for IBM-Cognos customers to adopt complete BI and data warehousing solutions that can more quickly generate a positive ROI because they are pre-integrated.
- **Cognos 8 BI & Data Manager** pre-integration with **IBM Information Server** adding top-class BI to this industry-first IBM software platform that delivers seamless data integration, data quality, and ETL. Also provides metadata integration that enables full data lineage to track and validate the basis for business decisions. *(IBM Information Server is assessed in Section 5.)*
- Pre-configured templates for integrating **Cognos 8 BI** with **IBM FileNet BPM** software, enabling customers to use Cognos 8 BI reports and analytics to support critical business decisions enabled by FileNet BPM.

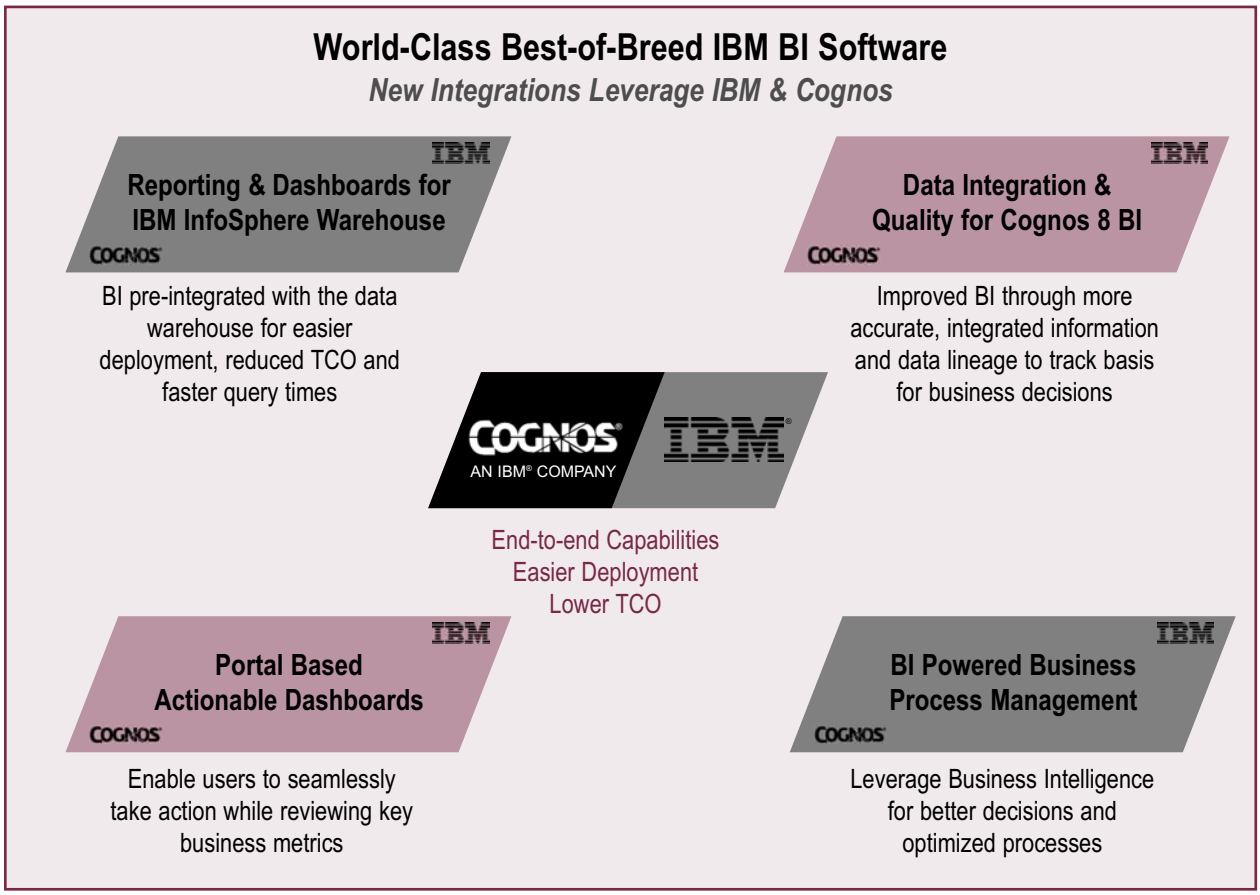


**Figure 11: World-class, Best-of-breed IBM BI Software**

- Pre-integration/bundling of **IBM Dashboard Accelerator "Starter Kit" with Cognos 8 BI**, enabling the rapid building of portal-based, actionable dashboards. These allow users to act and initiate operational transactions based on reviews of important business metrics. The **IBM Dashboard Accelerator** will also now include a **Cognos 8 BI "Starter Pack"**, along with a new **"Cognos Builder"**, to make it easy for users to create portal and dashboard components that include Cognos reports or analytics.
- **IBM-Cognos 8 BI software** will be included in the **IBM C-Class Balanced Warehouse**. These offerings provide pre-tested, scalable and fully-integrated solutions, combining IBM DW software, server and storage technologies. C-Class Balanced Warehouses offer SMBs what is claimed to be a simple and complete solution for integrating and maintaining multiple datamarts and information resources in a scalable, versatile DW.
- **New IBM Compliance Warehouse for Legal Control:** This new IBM offering helps customers to address their growing compliance, legal and governance challenges. It offers an information vault for storing all required evidence, aided by tools that automatically identify, classify and aggregate content and process information from multiple sources, and that allow organizations to analyze, monitor and deliver that information for legal and operational purposes. It combines IBM software, hardware and services in a unified environment that enables customers to achieve, sustain and prove compliance with multiple legal and compliance mandates while reducing cost, complexity and risk. The IBM Compliance Warehouse for Legal Control combines a secure content repository, IBM FileNet records management, content and e-mail archiving, and classification capabilities, combined with Tivoli and Lotus software and IBM storage hardware, to provide a cost-effective solution for reducing information risk and optimizing compliance and legal processes. This offering also uses Cognos' technology for monitoring, reporting and analyzing compliance-related content and processes.

## New-IBM-Cognos Joint Software Debuts

IBM-Cognos also announced new software for faster delivery of performance management information to help more employees make faster, more-informed business decisions. This new **Cognos "Builder"** feature uses data from reports generated by the **Cognos 8 BI** tool within the **IBM Dashboard Accelerator** software. This combination will help customers extract critical business performance data and present it in new, different, and more useful contexts, through their **IBM WebSphere Portal** applications and dashboards.

Cognos 8 BI delivers a complete range of analytical capabilities, on a single, SOA-based BI/EPM platform that helps customers author, share, and use reports, drawn upon data from across all of their organization's information sources. IBM Dashboard Accelerator is a relatively new tool for rapidly building dashboards, which are intuitive visualizations of information, customized to a specific job role or viewpoint within a portal. Portals are a technology providing external and internal Web sites that deliver personalized information. IBM Dashboard Accelerator helps customers build customized dashboards for specific jobs or tasks.

These assemble information from a range of different sources and present it through real-time, easy-to-read Web 2.0-style views. The product also provides alerts and tools enabling users to take timely needed actions. This new feature will allow millions of WebSphere Portal users to benefit from composite applications combining in-depth Cognos content with other applications and feeds, at a lower TCO, and is expected to become available by end-March 2008. It will also allow Cognos performance management information to be made available to hundreds of millions of WebSphere Portal, Lotus Notes, and Lotus Sametime, and other collaboration product, users, and to tightly integrate such data into WebSphere Portal applications, exploiting that product's main features, using a unified toolset. The feature eliminates the normal need to write any Java code, significantly reducing development skills, time, and cost to build customized dashboards.

## Ten New/Enhanced IBM-Cognos-enriched IOD Industry Solutions Announced

Also featured in the February 6th, 2008 IOD announcement were ten new and enhanced IBM IOD solutions for banking, retail, healthcare, government, life sciences, and manufacturing industries enhanced with Cognos capabilities. Each had been developed to address important, common industry core business issues, and to help customers turn their information into strategic assets to address these core issues.

- **Financial Risk Insight for Banking Solution:** This solution is based on industry best practices and proven IBM Banking DW technology, now coupled with Cognos 8 BI. Successfully deployed at numbers of world-leading financial institutions, this new combination now gives financial services companies an integrated, enterprise-wide view of risk across divisions, products, geographies, and risk classes.
- **Risk Adjusted Profitability for Banking Solution:** Provides integrated risk management and financial planning support. Exploits activity-based costing to build precise, multi-dimensional, product-level profitability plans and forecasts aligned with risk management strategies, enabling more accurate financial planning linking the bank's finance and risk organizations more closely.
- **Health Analytics:** Cognos tools will add broader BI capabilities into this new healthcare-provider solution, which will help these organizations optimize performance in areas from revenue cycle management to patient care. Details were later unveiled at the February 2008 Healthcare Information and Management Systems Society *(HIMSS)* annual conference.
- **Life Sciences Promotional Spending and Compliance Solution:** Empowers pharmaceutical companies to accelerate their ability to fulfill complex, evolving, US state promotional spend regulations, and build a platform for integrating critical customer, promotional spend, drug sales and clinical information to best enable improved business decision-making and planning.
- **Store Operations & Planning for Retail Integration Framework:** This complements the **IBM Retail Integration Framework**, adding Cognos' score-carding, reporting, analysis, and planning tools to help retailers improve retail performance. The solution provides an intuitive approach to optimizing store operations, planning, managing and measuring capital-intensive projects *(such as new store development)*, dealing with industry consolidations, and increasing profits and margins.
- **IBM Municipal Scorecard Blueprint:** Brings Cognos technology and extensive experience in the public sector to help government agencies establish a consistent framework for performance management and accountability in local, municipal and county governments.
- **Crime Management and Insight:** Law enforcement agency oversight and information management solution; however, no more detailed information is available at this time.
- **Manufacturing Sales and Operations Planning:** Combined Cognos' Sales and Operations Planning Performance Blueprints with extensive IBM manufacturing industry expertise into offerings enabling manufacturers to reconcile sales and demand forecasts with supply chain and production plans in line with corporate financial objectives, and to react more quickly to changing market conditions.
- **Workforce Analytics:** IBM Global Technology Services *(GTS)* & GBS previously partnered with Cognos to create **IBM Workforce Analytics solutions** based on **Cognos Workforce Performance**. Now these analytic applications provide customers with raised visibility into HR and learning data by delivering standard metrics and reports that enable informed business decisions based on reliable and timely information.

The rapid introduction and/or extension of these invaluable IOD industry solutions, within two days of the Cognos acquisition closure, amply shows the strong synergy at play here. Each provides a useful accelerator for industry customers faced with the targeting challenges and needing a proven, rapidly-deployable solution.

## New IBM GTS IOD Practice, New IOD Services Launched

At the announcement, IBM also revealed its new IOD Infrastructure Community of Practice *(CoP)* within its IBM GTS organization, and major new IOD service offerings. Chartered/established to build, exchange, and to facilitate reuse of, IOD knowledge, assets, and best practice, this CoP helps develop new IOD capabilities and share leading-edge thinking across IBM's Software, Business Consulting, Systems and Research units. The new GTS IOD services *(overviewed below)* help clients plan, design and deploy a resilient enterprise data, storage and content management infrastructure to deliver IOD at lower risk with a higher ROI on IT investments, IBM claimed.

- **IOD Infrastructure Implementation Services:** Combining best practices and methodologies to quickly and cost-effectively deploy a highly-available, reliable, dynamic DW, including all relevant components needed. These services allow customers to make better-informed decisions with less risk, while providing a faster path to a higher ROI.
- **Storage Optimization and Integration Services:** Enables design, deployment and operation of efficient storage and data infrastructures. Helps to better integrate current storage environments, and to improve storage utilization and management. Includes proven IBM methodologies/software to give customers full understanding of their storage environments, through enterprise-wide assessment and reporting on their storage utilization, costs, and legal and IT compliance, that help them to achieve operational efficiency. Now includes the assets and services portfolio from IBM's recent acquisition of NovusCG, the market-leading provider of storage optimization, storage resource management, and process services on all major storage platforms.
- **Data Mobility Services:** Helps customers establish simple, unified approaches to managing and moving data on-line – over any distance, regardless of server platform or storage vendor. These services reduce operational risk without affecting performance. These services include data mobility software assets from IBM's recent acquisition of Softek – the market leader in data mobility software.
- **Infrastructure Services for Compliance Warehouse:** Complements the new IBM-Cognos product of this name reviewed above. Provides infrastructure consulting, design, and implementation assistance for information and ECM and archiving activities. Provided by IBM GBS and IBM GTS, these services enable enterprise-wide facilitation of structured and unstructured information flow, access, and control for compliance, litigation, and business needs, including long-term preservation. The services include gathering of retention requirements, information classification, policy and governance definition and enforcement.

These, plus extensive Cognos product services capacity from Cognos services staff experts now with IBM, considerably extend IBM's already well-established, and many thousands of engagements-proven IOD services capability.

## IBM-Cognos – The System z Mainframe's Role

The System z mainframe has long been the home for many of the largest and most critical enterprise applications and databases, with an estimated 80% of structured, machine-readable data held on the platform. Many enterprise DW applications have also been long deployed on the platform, exploiting the powerful DB2-z/OS combination to deliver high-quality, co-resident, BI-focused, query and reporting data serving on mainframe hosts. *(We assess the latest advances in mainframe data serving in Section 6.)* Many of these mainframe DW/BI applications feed their output results into popular client and BI reporting tools themselves running on desktop or distributed server platforms. *(With the IBM-Cognos tools frequently used in this way.)*

This enterprise-wide data-serving hub role of the mainframe was made vastly more attractive and affordable with the advent *(from the System z9 mainframe generation onwards)* of the zIIP specialty processor engine. This offers much more economical mainframe DB2 processing *(including specifically DB2 BI-type operations)* as well as now also for IPSec networking, and XMP parsing processing.

In addition, many enterprises are now rapidly moving away from traditional, static, historical data warehousing and datamart approaches where these were fed and updated in arrears weekly or monthly via complex batch ETT/ETL loading processes. This outmoded, static data warehousing model often placed these "lagging-edge-data-filled", copy/extract/summarized DW and datamart databases off on dedicated, distributed servers *(usually UNIX, some Windows and Linux)*, adding cost, complexity, and more server and storage sprawl, to the enterprise IT Infrastructure. These also added lengthy batch update window time lags and delays to the warehouse updating cycle, as data was moved down from mainframe sources through ETL processes and then loaded.

Today, a new generation of real-time, dynamic data warehousing and datamarts are emerging. These run synchronously and in real-time with and alongside today's On Demand, operational SOA business applications. Where, as many of the latter already are, these new-generation, business-process-transforming, mission-critical operational SOA-based applications are running on the System z mainframe, it is now far better to locate the associated dynamic, real-time DWs on the same mainframe system also under DB2. Far better performance, lower latency, and easier integration between the operational and data warehousing applications, all at affordable costs with the zIIP engine, are the results. We expect these advances will enable the System z mainframe to recapture many major data warehousing/datamart workloads as these are upgraded to the dynamic, real-time model over the years ahead. The new IBM InfoSphere Warehouse, based on DB2 V9.5 dynamic warehouse technology *(discussed in Section 6, on page 42)* is the principal IBM software enabler of such strategic moves.

As far as the IBM-Cognos products are concerned, most are "client-side offerings" designed for desktop or mid-range server-based deployment, which can already fully interoperate with IBM mainframe hosts and database sources today.

On February 26th, 2008 *(in its new System z10 mainframe announcement)*, IBM announced **Cognos 8 BI for System z**, invited participation in a new, upcoming **Cognos 8 BI for Linux on System z** beta program, and confirmed that this product will ship GA within 2H 2008. With this product, mainframe customers will easily be able to directly report on, and fully analyse, the hundreds of millions of transactions that their mainframes are processing in a sophisticated, dynamic warehousing environment.

## Our Analysis

The Cognos acquisition greatly extended IBM's IOD strategy. This major, cross-company initiative had combined traditional IBM leadership and strengths in data servers, content management, and information integration, servers and storage hardware, and business consulting services. Now added were the leadership Cognos 8 BI/EPM platform, solutions, and the skills that the Cognos team brought into the IBM portfolio.

*We assess this IBM-Cognos acquisition as a timely, and a near-perfect fit acquired at a reasonable price, one that hugely extends IBM's IOD value-proposition with the leadership-class Cognos 8 BI/EPM platform...*

We assess this IBM-Cognos acquisition as a timely, and a near-perfect fit acquired at a reasonable price, one that hugely extends IBM's IOD value-proposition with the leadership-class Cognos 8 BI/EPM platform, products and solutions. This allows IBM now to offer the most complete solutions for unlocking the business value of information, and substantially lifted IBM's ability to capitalize fully on the emerging business growth opportunities that IOD presents. Reciprocally, IBM's hardware, software and services capabilities, powerhouse R&D capabilities, and extensive global reach will readily allow faster and broader delivery of all Cognos products and solutions to more customers. All the developments for 2008 and beyond planned on the Cognos roadmap prior to acquisition are unchanged in coverage, and will be delivered as scheduled, because the parties have almost no integration and rationalization work to be done, unlike major competitors.

The new offerings above greatly extend IBM's end-to-end IOD software, hardware and services portfolio. They considerably extend IBM's ability to enable customers to have the right information they need when they need it, together with deep business insights they can exploit for competitive advantage and to respond to changing market demands. This Cognos acquisition rapidly and smoothly integrated into IBM's powerful IOD charge, and hugely boosts IBM's business strategy and roadmap here. It will be warmly welcomed by current sole and joint mutual customers of Cognos and/or IBM IOD products, solutions and services who will enjoy the major synergy/integration benefits presented here quickly.

In our assessment, by this acquisition and rapid integration of Cognos, IBM also further extended its IOD competitive advantage over its market opponents. Microsoft's lower-level, but low-cost and inclusive, BI/EPS offerings on only its Windows plus SQL Server DB platform, now looks relatively weaker, more proprietary, and not technically comparable to IBM's new IOD line-up including Cognos.

Oracle had, in our view, picked up the weakest of the three major BI/EPM vendors sold last year, albeit the one that was most primarily an application solution provider, rather than a generic BI/EPM tool platform vendor, in its choice of Hyperion Solutions. Oracle seems more concerned with lifting the BI/EPM strengths it can offer atop its own enterprise applications suites, in order to compete more strongly with SAP, now including its Business Objects wing.

SAP gained greatly with good-quality Business Objects BI/EPM tools, superior to its in-house offering, and will *(we assess)* now be most concerned about selling Business Objects' tools onto all SAP sites, rather than on winning "open market" *(non-SAP platform)* BI/EPM tool business. Although both these acquirers were quick to promote their existing or early integrations, each faces considerable product overlaps needing rationalization between their acquired, and existing, product portfolios, that are bound to take 12-15 months to work out, whereas the IBM-Cognos deal involved almost none.

IBM, we judge, now offers the most extensive, advanced, open-SOA-standards-based, and the most heterogeneous environments-focused BI/EPM and IOD product set in the industry. Combine that with the in-depth experience gained from thousands of IBM IOD customer engagements, plus the insights and advances from IBM's peerless researchers, and we consider IBM has now carved itself a real leadership position in this more widely defined IOD market though this transforming acquisition. Cognos also extends IBM's reach much deeper into the CFO's office, because its financial planning, budgeting and consolidation solutions have long appealed directly to CFOs, as well as to other important end-user professionals and management communities across many other business functions.

Readers should also watch for arrival of the mainframe Cognos 8 BI Under Linux on System z implementation that is soon entering beta, and will ship within 2H 2008, says IBM. This will bring the full power of the Cognos 8 BI engine onboard the mainframe enterprise-wide data hub, complementing the major advances made in the DB2 for z/OS V9.0 release, especially in data warehousing, on the platform. *(See Sections 5 and 6 for more details.)*

# 5. IOD Information Platform – IBM's New-generation Servers Blossom

## IBM's IOD Information Platform – Introduction

Review Figure 4 on page 15, which portrayed, described and positioned the three main layers of IBM's IOD architecture, again. The upper BI/EPM layer comprises primarily the integrated IBM-Cognos offerings, fully assessed in our previous Section 4. The middle layer of this IOD architecture is what IBM terms its **IOD Information Platform**. This is an important, mainly new technologies-based, set of powerful IOD software servers. These sit above the third-layer database servers, ECM servers, enterprise applications, and other underlying data sources. They feed and support the top layer of BI/EPM information delivery to users, and feed SOA composite applications needing consistent information.

This Section 5 looks deeply at the three, primary, new IBM IOD server software product families, and their associated tools and technologies, that now deliver these important, enterprise-wide IOD Information Platform software service functions, and also examines the role of the System z mainframe as the host for these. We thus cover the following important, new offerings:

- **IBM Information Server for System z.**
- **IBM InfoSphere MDM Server.**
- **IBM InfoSphere Warehouse.**
- **IBM Data Studio.**

## "IBM InfoSphere" – Major New IBM Software Brand-name Emerges

For many years to date, IBM Software enjoyed market leadership in application servers, and in related enterprise run-time middleware infrastructure software. Over the last three years, IBM also successfully extended that good position to grab a now-dominant lead in enterprise SOA software and services *(with the IBM SOA Foundation)*. Most of the IBM products in these segments carried the **"IBM WebSphere"** brand-words within their name. The "IBM WebSphere" brand-words became associated with sophisticated, enterprise-class, SOA run-time middleware of the highest quality, enjoying premium IBM support, packaged and priced appropriately for both large enterprise and SMB budgets, and widely acknowledged as major brand marketing, and prime software segment, successes for IBM.

Seeking to repeat this triumph, IBM has now created similarly evocative software brand-words for its burgeoning, new-technology-rich IOD portfolio of advanced information management middleware software. The new brand-words are **"IBM InfoSphere"**, and the recent IOD announcements above introduced the first two major IOD products to carry the "IBM InfoSphere" brand. We expect new IOD products will successively assume these brand-words in their naming, as new versions of other-named, existing, and all-new family, products are released in future. "InfoSphere" will thus become a useful explanatory tag and brand for IBM IOD software offerings, as WebSphere has long been for run-time applications infrastructure.

## IBM Information Server for System z – Enterprise Information Integration Directly on Mainframe

On October 15th, 2007, IBM announced its IBM Information Server platform had been extended to embrace the scalability, security, manageability and reliability of the System z mainframe, enabling customers to perform enterprise information integration directly on their mainframe *(and to exploit their mainframe resource investments)*, for the first time. **IBM Information Server for System z *(IIS for System z)*** is IBM's fully-integrated enterprise information foundation platform that profiles, cleanses, transforms and delivers information from both mainframe and distributed data sources together, to reveal greater insight into the business, but without added IBM z/OS operational costs.

This powerful middleware server provides a unified foundation for enterprise information architectures, delivering trusted information for important IOD business initiatives such as BI, real-time reporting, data migration, data warehousing, data governance, CRM, and SOA projects. This Linux software for System z also provides rich security features, stability, flexibility, interoperability, and reduced software costs. This release of the IBM Information Server for System z follows the successful release and deployment of the IBM Information Server for Multi-Platforms *(UNIX & Windows versions)* which went GA in November 2006.

This enhanced release also includes improved high-volume and real-time certified connectivity to SAP, and improved real-time change data capture and replication technology from IBM's DataMirror acquisition, allowing integration, cleansing and analysis of high volumes of data from production systems, without impacting performance.

With its new desktop metadata glossary search capabilities, IBM Information Server also enables users to search key business terms and taxonomies from many applications, such as Microsoft Excel or modeling tools or reporting software, to understand how those terms are used within their information integration environment.

Expanded federation support was also added, to address a broader range of data integration problems through improved handling of XML and Web services via access to, and manipulation of, remote XML data using IBM's pureXML technology. Additionally, improved security for federation services improves the ability to audit data access for data governance purposes.

The main components of the IBM Information Server for System z are listed and each briefly described below, which neatly sketches and illustrates its wide-ranging capabilities:

- **WebSphere DataStage for Linux on System z:** Extracts, transforms, and loads data between multiple sources and targets on the mainframe.
- **WebSphere Information Analyzer for Linux on System z:** Profiles and establishes an understanding of source systems, and monitors data rules on an ongoing basis, to eliminate the risk of proliferating "bad" data on the mainframe.
- **WebSphere QualityStage for Linux on System z:** Standardizes and matches information across heterogeneous sources on the mainframe.
- **WebSphere Metadata Server for Linux on System z:** Provides unified management, analysis and interchange of metadata through a shared repository and services infrastructure on the mainframe. *(See Appendix C for more details.)*
- **IBM Metadata Workbench for Linux on System z:** Provides end-to-end metadata management, depicting the relationships between sources and consumers on the mainframe. *(See Appendix C for more details.)*
- **WebSphere Business Glossary for Linux on System z:** Creates, manages, and searches metadata definitions on the mainframe. *(See Appendix C for more details.)*
- **WebSphere Information Services Director for Linux on System z:** Allows information access and integration processes to be published as reusable services in an SOA on the mainframe.
- **Connectivity Software:** Provides connectivity software for efficient and cost-effective, cross-platform, high-speed, real-time, batch and change-only integration for your mainframe data sources.

As these component descriptions above show, the IIS for System z provides mainframe users with rich capabilities to understand disparate data sources, cleanse data to ensure consistent quality, and transform, move, access, and restructure, diversely-sourced information. It also provides a single framework for delivering IOD enterprise-wide by integrating shared metadata, logging, security, a service registry, configuration, and installation; and thereby providing much more control over, and manageability of, data and information assets. The industry's broadest federation support enables IIS for System z to directly access the widest range of heterogeneous data sources of many types, including relational, other structured, XML, messages, and Web, on and from the System z mainframe.

The server provides trusted information and control through its metadata-driven integration that visually depicts the relationships among data sources and data users, and provides proof of data lineage required by many compliance regulations directly on the mainframe.

The IIS for System z therefore provides complete data transparency and a unified view of all enterprise structured and unstructured data sitting on *(or network accessible to)* its mainframe host. It makes all this information appear to come from this single source server, regardless of how or where the underlying data is actually stored. It therefore fully virtualizes this enterprise information by completely de-coupling "information-service-consuming" IOD applications from the underlying data source*(s)*, thus providing far greater flexibility.

Client IOD applications fed by IIS for System z can therefore continue to work, regardless of any changes in how the underlying data is actually stored. Support for SOA open standards was naturally a vital aspect of IIS for System z server design, and these include Web services standards, SQL, JMS, EJB, SCA, II4BPEL, and CDC. The IIS for System z has also been architected for scalable high performance, with sophisticated optimization of distributed queries and advanced caching, and with in-built fault tolerance for high availability. The server also offers flexible bindings, so that information services can be deployed as EJBs, JMS, or Web services, and now as SCA, to meet diverse project requirements.

The product was also designed to be highly autonomous and non-disruptive to data sources, existing applications and systems. It supports rapid deployment, enabling new information services *(including WSDL, directory entries, and service artifacts in application server)* to be deployed in minutes without any Java EE™ skills being required. The IBM Information Server for System z was made available worldwide from November 2007.

IBM has now also set up the "LeverageInformation" *(www.leverageinformation.info)* user community, to rapidly deliver training, education, collaboration, and best practices, worldwide for all IBM Information Server users. This community is now encouraging collaboration and best practices sharing, via local user groups, and via virtual special interest groups on important integration technology areas. New content-on-demand capabilities, within the IBM Information Server itself, now keep users informed in real-time on their desktop, including via a Web 2.0-based utility that dynamically receives and organizes all IIS and related content in one place. Membership is free and open to all customer organizations, partners, and academia.

**Analyst Comment:** As enterprise information technology infrastructures grew in complexity over the last decade, they came to comprise the wide variety of applications, technologies, platforms, and databases seen today. As a result, information integration between so many disparate systems and sources of information had become an overwhelming challenge for enterprises modernizing their business processes with next-generation SOA applications. The **IBM Information Server for System z** is the industry's first and most comprehensive strategic enterprise information integration platform and ETL/ETT engine combined. It now provides a truly comprehensive, SOA open-standards-based, enterprise-wide information integration solution from the System z mainframe that hosts such a high proportion of enterprise data.

*...a truly comprehensive, SOA open-standards-based, enterprise-wide information integration solution from the System z mainframe...*

The IIS for System z combines, merges and integrates a number of earlier information integration middleware technologies *(EAI, ETL, and EII)*, embraces new standards, adds new metadata approaches, and deploys novel technologies, to create a genuinely new, and strategic class of major software server. We expect this new middleware server category, where IBM now stands far ahead, will assume similar importance as Java EE™ application servers and relational database servers command today in their sectors. A centerpiece of IBM's IOD strategy, the IBM Information Server also now takes its place at the heart of IBM's IOD offerings on the System z mainframe platform.

## IBM InfoSphere MDM Server – Industry-first Unified MDM Software

Master data is foundation information upon which enterprise operations and critical business decisions are based. Many enterprises today have master data siloed or strewn across multiple front and back-office systems that cannot be shared enterprise-wide, costing those businesses $ millions in missed revenues and operational inefficiencies. Enterprises desperately needed more flexibility, control, and unification in their use and maintenance of master data, if they are to compete and capitalize fully/quickly on emerging business opportunities. IBM introduced a new approach to this challenge, which it calls **multiform MDM**, to support the wide variety of ways companies define, create, and use master data in their daily operations.

First announced on October 15th, 2007 *(as "IBM Master Data Management Server")*, IBM's multiform MDM server was re-branded as the IBM InfoSphere MDM Server *(or "IBM InfoSphere MDM Server" for short)* at GA on January 30th, 2008 *(after it successfully completed beta tests during Q4 2007)*. This significant new server enables organizations to centrally manage their critical master data processes of storing, maintaining and updating information, across customer, product and account domains enterprise-wide, from within an industry-first, single, unified MDM product.

It centrally manages many different types of master data – such as customers, products, accounts, suppliers, citizens, employees, prospects, guests, agents, items, product bundles, parts, agreements, and more, information. A central pillar of IOD, and the industry's first multiform MDM software product, it offers sophisticated functionality and security rules for defining, creating, accessing, viewing, and editing, such master data, and using it as a strategic business asset across the enterprise.

It offers the strategic architecture, and the built-in intelligence and insight, that companies need to solve critical enterprise MDM issues, by providing an operational environment to store, maintain and update the enterprise's critical information about customers, products, and accounts, etc., data. The product is designed to be implemented within an SOA, and contains more than 800 business services that may be used out-of-the-box, and that enable it to manage both complex and simple master data inquiries and updates. In addition, it contains built-in intelligence and insight from the data that can be injected into day-to-day business transactions for improved operations across sales, marketing, and finance.

Advanced product capabilities help customers create/manage value packages and product bundles. One example usage is in retail banking, to manage each end-customer's savings, checking and credit card as a single, combined, and managed account – a business advance many banks struggled/failed to attain. Tailoring product bundles, and/or providing consolidated billings, payments, and statements, are other typical applications, as are creating new product combinations and hierarchies.

The product also now includes enhanced event notification features that can flag new data concerning a customer's status, preferences, and identity, helping enterprises to know and understand their customers better.

The IBM InfoSphere MDM Server also offers strong data governance capabilities to fulfill increasing needs for clearly-defined data maintenance processes. It includes new data stewardship task management functionality, to manage high load volumes for duplicate suspect processing, as well as enhanced workload management tools and user interfaces. The product significantly reduces operational costs, reduces integration costs associated with M&A, helps meet compliance and 'know your customer' regulation demands more easily and cheaply, and can often increase revenues.

Currently, this important IOD Server runs on AIX5L V5.3 *(System p, WAS, WMQ, DB2)* & Solaris V10 *(Sun T1000, BEA WebLogic, WMQ or BEA JMS, & Oracle DB)* OS. On the former, it can access and exploit DB2 for z/OS on the System z mainframe. These deployment options give customers the flexibility to use the product for both entry-level MDM projects, or for high-volume SOA MDM applications, with the one server platform capable of incremental, non-disruptive growth.

*This will allow mainframe-users to centrally manage their customer, product, and their account master data from within this single server...*

**Analyst Comment:** On February 26th, 2008 *(in its new System z10 mainframe announcement)* IBM announced that the IBM InfoSphere MDM Server for Linux on System z is to ship in the second half of 2008. This will allow mainframe-users to centrally manage their customer, product, and their account master data from within this single server, actually running from/on their mainframe platform.

## WebSphere Customer Center V7.0.1 – Transactional Customer Data Integration

Many types of business are intrinsically customer-centric. Success in these sectors demands that firms maximize sales of all products to each customer. Such customer-centric industry sectors include retail and wholesale banking, insurance, credit card provision, other financial services, telecommunications, healthcare, and many other customer-service-centric businesses. In these, retaining customers whilst successfully cross-selling multiple products into the customer base, both crucially depend on the availability of accurate and consistent customer information. However, siloed product-based systems often prevent any such "whole customer" view.

**WebSphere Customer Center** provides real-time, transactional Customer Data Integration *(CDI)*. CDI is an MDM approach that combines technology, processes and services to provide a unified view of each customer.

It helps organizations keep a single, complete, timely and accurate record of each customer across the multiple channels and business lines of the whole the enterprise. This integrated customer data provides a single version of customer "truth" to all customer-facing business channels, and to front- and back-office systems, through multiple interfaces. The product is based on open standards, and is designed to be implemented under an SOA. It includes over 500+ business services to manage and maintain customer data. It provides the infrastructure foundation to help companies move to a more customer-centric business model, improving customer service and cross/up-sell execution. Additional benefits include cost savings from the ability to recognize and process duplicate customer records.

New functionality includes enhanced search capabilities, delta-processing services, data corruption management and an aggregate view of known duplicate suspect records. Enhancements to existing functionality include out-of-the-box integration with IBM QualityStage *(a module of the IBM Information Server for probabilistic matching)*, the ability to do full party maintenance using the Data Stewardship UI, a new service that allows for a party to be retrieved based on role, and enhancements to the Rules Of Visibility *(ROV)*. Integration capabilities in this release are further expanded with the next phase of the Web services interface, and out-of-the-box integration with the IBM Information Server DataStage *(ETL)* and QualityStage modules, with the IBM Entity Analytics Solutions, and with Dun and Bradstreet services. WebSphere Customer Center is part of the expanding IBM MDM family of products, which are an important part of its IOD portfolio. The product exploits/leverages several key IBM software offerings, including IBM WebSphere Application Server, IBM DB2 *(various environments)*, and IBM WebSphere MQ.

## The IBM InfoSphere Warehouse – Dynamic Warehousing With DB2 V9.5

Originally announced on October 15th, 2007 *(as the IBM DB2 Warehouse V9.5)* this foundation IOD product was released to GA, under the new InfoSphere IOD brand name as the **IBM InfoSphere Warehouse**, on January 31st, 2008. *(For DB2 V9.5 platforms – see Section 6.)*

**Dynamic Warehousing Strategy:** IBM first announced its **Dynamic Warehousing strategy** in its major March 2007 IOD announcements. It portrayed this as the next generation of BI that enables enterprises to gain real-time insight and deeper value from their business information, and use IOD to transform their businesses by exploiting information more fully as a strategic asset.

The Dynamic Warehousing approach extends far beyond traditional first-wave BI/DW efforts that focused on query/reporting to understand **what** had actually happened in the past. The BI/DW second-wave focused on OLAP and data mining for deeper historical analysis – to understand **why** these events occurred and to recommend future action: strategic and tactical planning. By contrast, Dynamic Warehousing operates dynamically and in real time to help customers optimize each and every business transaction as-and-where these actually occur, such as in the call center, in the sales field office, when support staff are helping customers, or when taking orders. The strategy brought customers advanced analytics within real-time business processes, and unlocked knowledge buried in both structured and unstructured information *(free-form text, e-mail, audio files, and Web pages, etc.)*. It provided instant access to reliable, trusted business information within the context of whatever business transaction was being performed.

IBM delivered integrated Dynamic Warehousing offerings from Q1 2007-on, using many technologies from internal R&D and its strategic IOD acquisitions *(see Appendix A)*, including search and text analytics, information integration, process management, enterprise data modeling, MDM, and industry-specific business models. Its core foundation was the then-new, much-enhanced IBM DB2 Warehouse V9 – based on its DB2 "Viper" V9 data server – which included a unique set of features and capabilities that supported growing customer demands for analytics and IOD. *(DB2 "Viper" V9 has been available on the System z mainframe since March 6th, 2007)*. DB2 Warehouse Edition made it easier to purchase all the rich/powerful and comprehensive DB2 BI functionality packaged inside the new DB2 database release, offering robust, easy-to-use and manage data warehousing and analytics functionality all within a single product solution. This avoided the need for customers to buy and integrate several different BI/DW products.

The new **IBM InfoSphere Warehouse:** Is the renamed, successor **IBM DB2 Warehouse Edition V9.5** version, featuring new extreme workload management capabilities enabled by IBM's new DB2 "Viper 2" V9.5 data server *(see Section 6)*. The **IBM InfoSphere Warehouse** also brings many additional new, industry-first advances in embedded analytics and in high DW performance that allow customers to analyze, and gain greater real-time insight from, both structured and unstructured information, and then use this insight to make critical business decisions. The broad architecture and main capabilities of IBM InfoSphere Warehouse are shown in Figure 12, which also highlights the major, new or enhanced capabilities in this release.

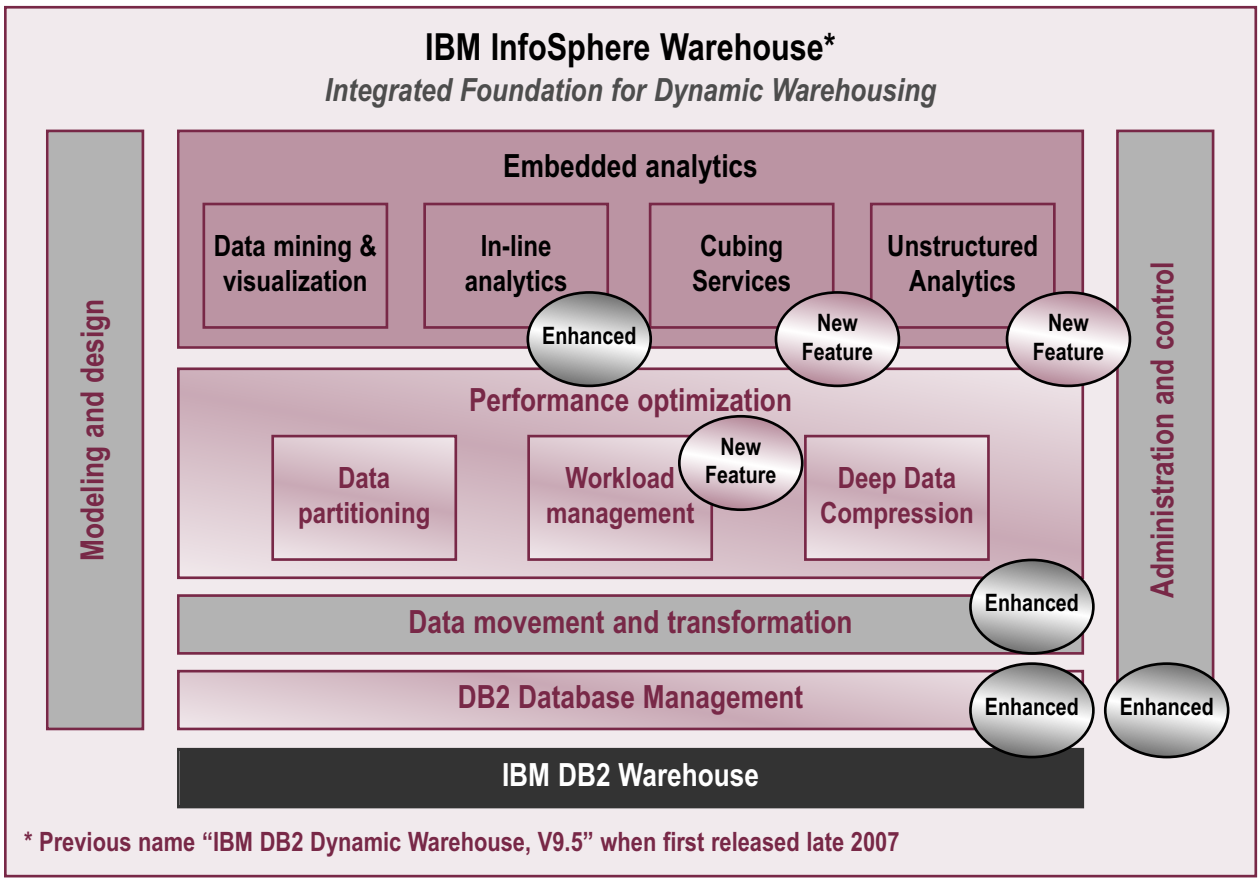


**Figure 12: IBM InfoSphere Warehouse – Integrated Foundation for Dynamic Warehousing**

This release features new capabilities for embedded OLAP, for embedded analytics for unstructured information, and for extreme workload management, enabling customers to address increasingly varied application and process real-time analytic requirements, to deliver access to trusted strategic business information from a unified DW. These capabilities are:

- **Integrated OLAP Cubing Services:** IBM InfoSphere Warehouse is the first DW product to offer embedded OLAP capabilities directly within the warehouse/database. These impressive, embedded OLAP capabilities now let customers perform deeper, multi-dimensional analysis, and generate increased insight, on up to a terabyte of base OLAP data without copying. Previously, users were always forced to extract multiple warehouse data cubes into specialized OLAP engines – at significant time, effort and cost of copying/replicating – to perform such complex analysis of multiple business variables and dimensions. This huge advance enables many more users to analyze data and generate business insights, and greatly reduces the costs of OLAP business reporting and analysis.

- **Embedded Unstructured Analytics:** Featuring embedded analytics support for unstructured information, another industry DW offering first, the product is now uniquely able to integrate and analyze structured and unstructured data at the same time. Traditionally, DW solutions could only leverage structured data, such as spreadsheets and database files, ignoring other critical information sources, including call center notes, customer feedback, technician comments, and other free-form text description fields. By analyzing unstructured information directly within the warehouse, enterprises will be able to extract knowledge and insights from previously untapped information sources, as well as broadening the scope of information used to make critical business decisions and to better serve customers.
- **Extreme Workload Management:** Gives customers the market's most dependable DW performance, mandatory for real-time operational intelligence and decision-making on live business processes, via setting/enforcement of business-policy-based DW user and work classes priorities. The product can easily also concurrently support all traditional strategic and tactical planning BI/EPM applications. This extreme workload management capability therefore enables substantial consolidation of today's multiple data marts and warehouses *(mostly needed for performance)*, greatly reducing warehousing costs.
- **Enables "One DW" Consolidation, No-copy Analytics:** The three fundamental, new IBM InfoSphere Warehouse features listed above now enable realistic migration to a "no-copies" data warehousing/analytic environment, where real-time access to a single, unified DW serves both real-time operational and analytical needs. It also, for the first time, melds structured and unstructured data access, and conventional BI query/reporting as well as OLAP multi-dimensional analysis, into this single warehouse. This eliminates the duplication of data across several DWs and/or proliferating datamarts, the multiple heavy ETT/ETL computing processes needed to support these, the latency issues of data movement that come with such complex environments, and the substantial risks arising.
- **Performance Management Suite:** Provides DW performance analytics *(including Alphablox reports*), DW workload monitoring, DW system monitoring, and DW workload management capabilities. These capabilities sharply reduce unit DW support costs as BI and DW deployments expand, greatly increase productivity and operational efficiency, and also reduce operational risk exposure. The two main features now offered include:
  - **Performance Monitoring Feature:** Query workload analysis that correlates user activity, data usage and query performance metrics – without disrupting or adding overhead to production systems.
  - **Performance Optimization Feature:** Database and operating system level analysis for system-level optimization and control of resource consumption.
- **Enhanced and Simplified Data Movement and Transformation:** New graphical tools, with advanced scheduling and automation for ease of use, along with increased compliance features, and tighter integration with the IBM Information Server, were also delivered.
- **Easier to Build Analytical Application:** A graphical interface tool for quicker assembly of analytical applications without programming. *(See the IBM Data Studio platform assessed below.)*
- **DB2 "Viper 2" V9.5 Database Management Enhancements:** Delivers better performance and increased compliance capabilities of DB2 V9.5, while lowering the cost of database administration through increased autonomics.

**Analyst Comment:** The integrated, comprehensive IBM InfoSphere Warehouse package substantially extends the integral data warehousing capabilities previously offered in the IBM DB2 Warehouse V9. It exploits the considerable further advances of the DB2 V9.5 database itself, adding important new data warehousing services that advance the IOD capabilities it now offers substantially. We assess that this IBM enterprise data warehousing IOD product will radically alter how enterprises do their data warehousing over the next decade.

*We assess that this IBM enterprise data warehousing IOD product will radically alter how enterprises do their data warehousing over the next decade.*

For the first time, it enables convergence of OLTP applications and BI database workloads onto a single, unified, common database/DW platform that is now truly equipped to support and deliver real-time data warehousing, large-scale operational data stores, and batch workloads, concurrently. The extreme workload management capabilities added enable customers to deliver the business service levels required for the varied different applications using their unified warehouse. Integrating unstructured data access and also providing integral OLAP multidimensional analysis, both within the same, common warehouse environment, is also a huge advance, and offers customers major savings and other advantages. The improved performance management provided by real-time monitoring and real-time resource management provides the visibility and controls to ensure that performance demands are met.

IBM has as yet not announced any plans for an IBM InfoSphere Warehouse offering for System z. Some of its capabilities are already provided within the DW features offered in DB2 for z/OS V9.

## The IBM Data Studio Platform

In its October 15th, 2007 IOD announcement, IBM also unveiled its new Web-based, integrated data management tools environment: **IBM Data Studio**. The Eclipse-based IBM Data Studio platform was created to serve as a development hub that now allows IOD customer database developers and administrators to plug-in other Eclipse add-in data tools, both from IBM and from other vendors. It was aimed to help these staff seamlessly manage enterprise data by sharply improving the processes of designing, developing, deploying and managing their database and application environments from any location and at any time. The broad functional capabilities of the IBM Data Studio platform are show in Figure 13.

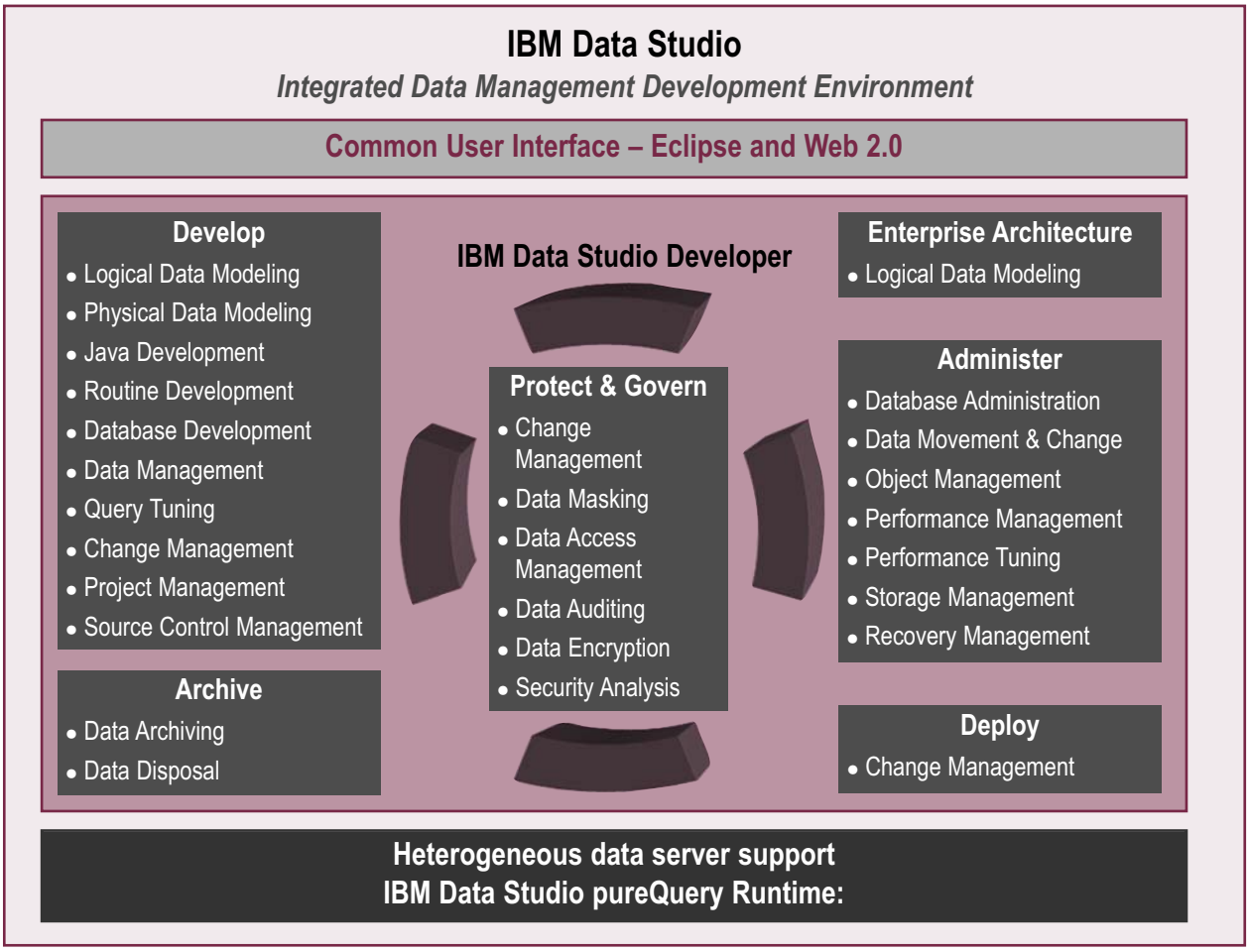


**Figure 13: IBM Data Studio – Integrated Data Management Development Environment**

Two major IBM Data Studio platform components are now offered:

- **IBM Data Studio Developer V1.1:** For database developers, this new, easy-to-use and learn tool radically improves how databases and database applications can now be built, tested and deployed, offering an integrated query editor for SQL and XQuery. Built on the flexible, extensible IBM Data Studio platform, IBM Data Studio Developer provides a complete development environment for building, altering and optimizing database objects, queries, and database logic, including Java and SQL stored procedures, and for user-defined functions. It also supports capable new XML development capabilities, including use of XQuery, and the ability to access data via SOA technologies such as SOAP, XML, and REST-full Web services. The tool rapidly develops/customizes the SQL inside Java applications, and simplifies development of applications applying industry-specific XML standards. It also introduces the IBM Data Studio pureQuery Runtime *(see below)*, which IBM claims is an innovative approach to building higher-quality, better-performing database applications, while greatly improving Java programmer productivity. The tool is "Info 2.0 Ready, with full support for "Web 2.0" protocols and formats, and provides deep support for enterprises to deliver "information as a service".

IBM Data Studio's integrated data management development environment has been shown to cut development time by up to 50%. The tool also facilitates closer collaboration across the development roles, helping optimize data server and application performance. Its pureQuery data access support increases Java development productivity; for example, by automatically generating test data for the user's pureQuery applications. The tool also allows data staff to develop and publish data as a Web service without programming.

Finally, the tool's Web-browser interface allows developers and DBAs to monitor data server operations and performance from any remote location, at any time.

- **IBM Data Studio pureQuery Runtime V1.1:** Provides a runtime environment able to accelerate performance of Java application code. The product harnesses the power of SQL within an easy-to-use Java data access platform. When deployed on popular Java application server platforms *(such as IBM WebSphere Application Server)*, IBM Data Studio pureQuery Runtime provides a more manageable, more secure means of connecting Java applications to IBM DB2 for Linux, UNIX, and Windows, DB2 for z/OS *(DB2 Connect required)*, and the IDS, relational data servers. This increases the productivity of all roles in Java development throughout the data lifecycle. The Runtime can also deploy advanced pureQuery applications using static SQL, for better application performance, with more predictable responses. The IBM Data Studio became electronically available from December 14th, 2007, just two months after its October 15th, 2007 announcement.

The IBM Data Studio Administration Console can also perform live monitoring and alert management for DB2 for Linux, UNIX and Windows v9.5 servers, as well as live monitoring of WebSphere Replication Server and WebSphere Data Event Publisher.

**Analyst Comment:** The IBM Data Studio platform is a most important addition to the IBM IOD portfolio. It provides a single, unified, open, extensible, modern data-centered development tool environment, together with an efficient Java data access run-time environment that supports all the IBM relational database environments. We warmly welcome this capable, Eclipse-based tool for DBAs, database developers, and for all data-centric IOD SOA developments. IBM Data Studio can also be used in combination with IBM Rational Data Architect V7, which provides comprehensive enterprise data modeling capability within the Rational Software Development Platform.

## IOD Industry Frameworks Address Industry-specific Information Needs

IBM also introduced important, new IOD industry frameworks and industry data models that combine software, strategic planning services, and a set of pre-configured templates, to help customers use information as a strategic asset within major vertical industry sectors. Built upon expertise IBM gained from hundreds of customer engagements, along with its proven industry data and process models, these IOD industry frameworks address information-intensive challenges in the banking, retail, insurance, and telecommunications industries, as well as in the public sector. The IOD industry frameworks were designed to address more than 85% of customer data management requirements "out-of-the-box" and can speed time-to-market/time-to-value by reducing solution analysis and design effort by more than 40%. The frameworks exploit IBM's established family of industry models that provide repeatable templates to guide customers through the process, service and components, needed to overcome their industry-specific information management challenges.

Customers using these IBM IOD frameworks benefit from proven, trusted approaches, data models, and standards that accelerate deployment of strategic, information-centric business initiatives, such as multi-channel marketing, consumer-driven merchandising and supply chain management, managing risk and compliance, accelerating new product introductions, ensuring a positive customer experience, and improving financial management. 11 new models, for example, were revealed in the major IOD October 2007 announcement.

## Our Analysis

During 2007 and 2008 to date, IBM has maintained an impressively rapid drumbeat of significant new IOD software, solutions, services, and partnerships that have greatly advanced and extended its realization of its IOD strategy and portfolio. In addition to the major developments in the BI/EPM upper layer of its IOD architecture through IBM's largest ever acquisition of Cognos, covered fully in Section 4. Recent months have also witnessed major developments in the IOD middle-tier architectural layer that IBM terms its IOD Information Platform. This Information Platform is designed to help customers use trusted information in real-time to optimize their businesses, to better compete and to take advantage of emerging business opportunities.

These important new IOD software offerings include advanced, technology-leadership servers for:

- **New Enterprise-wide Information Integration for mainframe:** IBM Information Server for System z under z Linux became available in November 2007.
- **New Multiform MDM:** IBM InfoSphere MDM Server for Linux for System z was announced for 2H 2008 availability.

*These strong servers unify, transform and deliver enterprise-wide information as a service to the top IOD layer, often now of IBM-Cognos BI/EPM tool applications, and other SOA "information client application".*

The wide range of new and advanced software technologies that comprise the IBM IOD Information Platform discussed above is impressive, has already been delivered, and will all be available on the System z mainframe by later in 2008, with the foundation IBM Information Server for System z already out. These strong servers unify, transform and deliver enterprise-wide information as a service to the top IOD layer, often now of IBM-Cognos BI/EPM tool applications, and other SOA "information client application". The IOD Information Platform servers on System z are, in turn, fed and supported by the high-performance mainframe DB2 and IMS data servers and ECM engines, assessed in the following Section 6.

*"IBM has applied all its software, hardware and industry expertise to help customers dynamically use trusted information to optimize business processes, become more competitive and capitalize on emerging growth opportunities with IOD." said Ambuj Goyal, General Manager, IBM Information Management Software.*

# 6. System z Data Servers & ECM IOD Foundations

## Enterprise Data Serving for IOD on System z Mainframes – Introduction

For over four decades, IBM mainframes have been platform leaders in data and transaction serving. Long powering these large DB workloads were the twin "data serving" software engines on the platform, the immensely powerful, rock-solid, and widely respected:

- **DB2 for z/OS**, IBM's pioneering, leadership RDBMS, deeply optimized to fully exploit the unique System z-z/OS QoS capabilities, for transactional, BI/DW, and batch applications, workloads.
- **IMS *(Information Management System)***, the legendary, very-high-performance, very-high-transaction-rate-capable, hierarchical database management and teleprocessing subsystem that runs many of the world's most demanding, mission-critical OLTP systems.

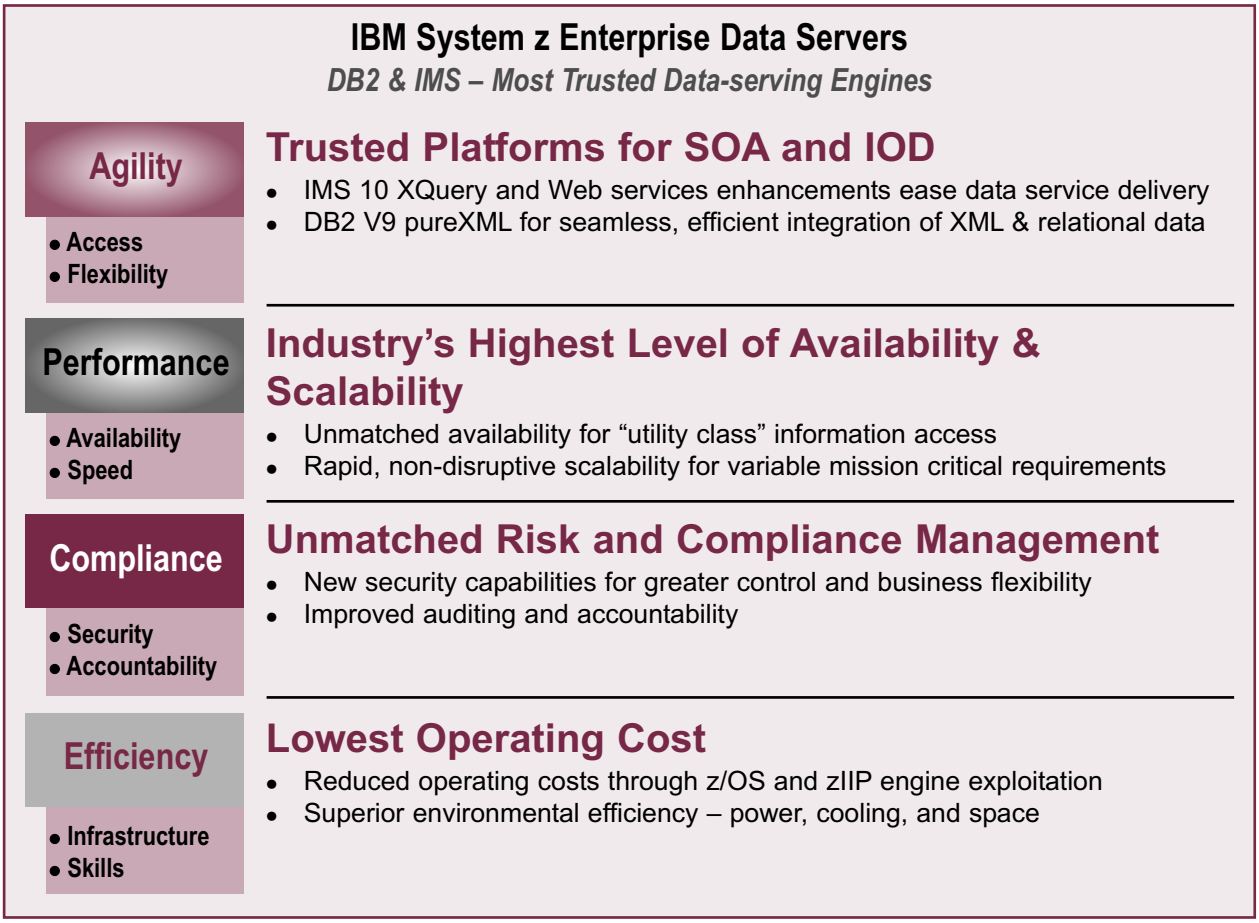


**Figure 14: IBM System z Data Servers – DB2 & IMS Most Trusted Data Serving Engines**

The broad highlights of the major advances made by IBM to enhance the IOD foundation mainframe data servers are shown in Figure 14 *(on page 42)*. These are grouped under four main headings of advance type – **Agility**, **Performance**, **Compliance**, and **Efficiency** – and these highlight just why the System z mainframe is the natural choice as the enterprise-wide IOD hub.

To reach the leading position that System z clearly now holds today, IBM had *(for the last several years)* invested massively, and had driven hard implementing numerous, advanced new technologies, to further greatly extend, strengthen, and modernize its entire System z mainframe offering. These advances have now made it the clear, premier, and highly-differentiated, enterprise-wide data-serving platform to underpin IOD implementations. In reaching this goal, now successfully accomplished, IBM fully exploited the legendary System z hardware QoS and business values, these system's massive power, memory and I/O capacity, and also radically upgraded both the above mainframe database server engines to deeply embrace and support SOA/XML and IOD requirements.

IBM also added the System z zIIP *(now processes DB2, IPSec, & XML workloads)* and zAAP *(now processes Java and XML workloads)* specialty processor engines. These engines brought significant operational cost savings when they were running qualified enterprise Java EE™, SOA and DB2 data-serving-centered workloads, rather than when more costly, general-purpose mainframe CP engines, with their higher software-costs capacity, were used.

The transformed, resurgent IBM mainframe long played a central role in hosting and managing up to 80% of enterprise machine-readable data, both structured and unstructured. The **System z9-z/OS-DB2** combination already smoothly runs most of the world's largest relational databases, such as those at UPS *(world's most transactions known on one DB, 1.1B SQL statements per hour)* and the UK Land Registry *(the world's largest data OLTP DB – 32TB)*. These new advances now make today's System z mainframe *(especially in its latest System z10 EC high-end form, as announced on February 26th, 2008)* the premier, enterprise-wide, central IOD delivery platform. It is clearly now the best host for major IOD initiatives, including dynamic BI/EPM, data warehousing, and for supporting the major new SOA transactional systems that increasingly run alongside on the platform.

*...today's System z mainframe... the premier, enterprise-wide, central IOD delivery platform.*

## DB2 "Viper" for z/OS V9 – One Year in Field – Integrated XML & Relational Data for SOA & IOD

DB2 "Viper" for z/OS V9 for System z mainframes shipped from March 16th, 2007, and was the first database management system to provide full, native XML support, as well as SQL support, a major advance pioneering a new, unified hybrid relational/XML, high-performance, highly-available database model. This mainframe DB2 release has proved highly successful and popular, with rapid user adoption seen over its near-first year of field deployment.

DB2 for z/OS V9 built further upon the well-proven DB2 for z/OS V8.0 capabilities in areas such as online schema evolution, Unicode, XML, SQL, utilities, security and compliance, and 64-bit virtual storage. Featuring literally hundreds of new features for mainframe customers, DB2 for z/OS V9 also extended its unmatched security, and enhanced its deep data storage compression capability that significantly reduced storage volumes, and increased performance.

This release also deeply optimized the data server for its central role in SOA, where IBM's SOA Foundation *(WebSphere)* software now holds a clear and dominating industry leadership position. To enable successful SOA deployment, this release provides increased business flexibility without sacrificing control, deeper WebSphere integration for trusted applications and Web serving, and extensive security and SOA governance capabilities. Amongst the other, more significant advances shipped in this major mainframe data server release were:

- **Patented IBM pureXML™ technology:** For seamless and efficient integration of XML and relational data in a unified, hybrid databases environment, helping to optimize SOA initiatives.
- **XQuery & SQL query support:** DB2 for z/OS V9 natively supports XQuery, the industry-standard language for processing XML data, as well as standard SQL, so applications can retrieve from either or both of these underlying storage formats.
- **Exploits zIIP System z specialty processors:** DB2 for z/OS V9 extensively exploits the zIIP specialty engine, which automatically runs three main DB2 workloads *(and now also IPSec and XML parsing workloads)* for mainframe SOA data-serving and IOD at much lower cost *(processor hardware and software charges)* than when using standard CP processors.
- **Extensive optimization, portability improvements:** Including performance-boosting innovations, synergy with IBM System z hardware, and query management enhancements driving increased cost savings. Native SQL stored procedures also enhanced portability and ease of use.

- **Dynamic warehousing support:** Incorporates extensive, in-built warehousing functionality to facilitate rapid, secure user-access to data analysis, offers improved query and reporting optimizations, supports interactive executive dashboards and information portals, and extensively exploits zIIP *(e.g. SQL Procedures)*. IBM claims over 50 features that support data warehousing were added in DB2 V8.0 and V9 combined.
- **BI/EPM and dynamic warehousing performance gains:** Improved performance, specifically on dynamic warehousing as well as on OLTP workloads. These include an up to 50% reduction of storage for indexes, improved index compression, and an up to 50% reduction of CPU utilization on most utilities.
- **Enhanced autonomic capabilities bring lower TCO:** Increased breadth and depth of self-managing, self-optimizing and self-repairing autonomic capabilities further reduce support staff time, effort, and cost needed to support DB2 for z/OS instances. These combine with other advances to sharply reduce DB2 for z/OS V9's TCO.
- **Industry's highest scalability & availability:** DB2 for z/OS has shown near-linear scalability for up to enormous database workloads *(on the underlying System z-z/OS platform that now supports <64-way SMP servers and <32*System z Parallel Sysplex clusters)*. It also offers the highest levels of availability attainable on any regular commercial database system/platform.
- **Extensively optimized for SAP:** Close IBM-SAP collaboration saw DB2 for z/OS V9 incorporate over 40 features specifically included to optimize its integration with, and performance on, SAP System z-based enterprise applications. With over 1,000+ DB2 for z/OS SAP installations now running, this is important news for these joint IBM-SAP customers.
- **Helps manage risk, streamlines regulatory compliance:** This release adds enhanced security and compliance tracking, improved auditing and privacy capabilities, encryption of key DB2 resources, support for trusted security contexts, and for defined database roles, in the compliance environment.
- **1st DBMS supporting all three partitioning methods:** DB2 for z/OS V9 is also the first database able to support all the three common database-partitioning methods simultaneously. It can simultaneously support range partitioning, multi-dimensional clustering, and hashing. DB2 V9 therefore enables organizations to best arrange and order their database information in the most suitable way according to their specific needs.
- **Lower complexity, reduced database administration costs:** DB2 for z/OS V9 also provides fast table replacement, the ability to partition a database by growth or index compression, and a new Optimization Service Center; which all simplify operations and reduce support effort/cost.
- **Faster development:** To further speed development and reduce risks, the new release also supports native SQL stored procedures, provides default databases and tablespaces, and provides automatic unique indexes to support and define primary keys.

These DB2 "Viper" native XML capabilities greatly benefit SOA implementations that rely on accessing a myriad of data stored across multiple formats. It has freed data from the static, rigid form forced by relational-only database products, allowing DB2 "Viper" to deliver IOD throughout an enterprise SOA or BI/EPM environment.

The hybrid, multi-structure database breakthrough greatly simplifies enterprise infrastructures, increases flexibility, enables customers to increase the availability, speed, and versatility of their IOD services, while dramatically reducing costs, but can still exploit the market's widespread, existing DB2 skills base.

It also significantly reduces the complexity, time, and effort developers need to create applications able to access both relational data and XML repositories, which is crucial, given the pervasive role that XML now plays in enterprise SOA architectures. In our view, such native XML database support is now definitively required for data fidelity, asset utilization, performance optimization, and to exploit the mature data management services found in an industrial-strength database management system like DB2.

With DB2 for z/OS V9 IBM also announcing new and enhanced DB2 tools, including:

- **IBM DataQuant:** Query, charting, analysis, and dashboards for rapid development and deployment of BI applications.
- **DB2 Optimization Expert:** Offers a comprehensive set of index and statistics advisors to improve DB2 system performance and lower TCO.
- **DB2 Utilities Suite:** Extensive set of ultra-high-availability DB2 utilities to complement the RDMBS, speed DBA tasks, support zIIP processors, and fully support new DB2 for z/OS V 9.0 enhancements.

The now-extensive, 46 products-strong, collection of IBM DB2 tools, all shown in our Appendix C, Figure C1, supported and exploited DB2 for z/OS V9 from its GA date.

**Analyst Comment:** DB2 for z/OS V9 was the culmination of a 5-year IBM development project and built on the DB2 "Viper" V9 data server first introduced for Linux, UNIX and Windows in July 2006. We assess DB2 "Viper" for z/OS V9 as a truly industry-leading database advance. Huge advantages flow from its hybrid relational/XML multi-structure database model. It allowed developers to store and handle both relational tabular data and hierarchical XML data within a single data management infrastructure much more easily, with equivalent access via SQL and XQuery, without any loss of the richness of XML content, and with excellent performance.

*DB2 "Viper" proved to be IBM's fastest-growing, most successful data server product in more than 20 years...*

DB2 "Viper" proved to be IBM's fastest-growing, most successful data server product in more than 20 years; during its first year to market it reportedly propelled IBM to four consecutive quarters of double-digit database revenue growth. Supporting this impressive $ growth, IBM revealed DB2 "Viper" had also consistently won new-name data-server customers, and numerous competitive win-backs, for the giant. IBM has claimed that hundreds of customers around the world, across various industries, have moved databases from Oracle to DB2 V9, based on "Viper's" record performance and unmatched features. Examples cited included the City of Los Angeles, American Electric Power, Central Michigan University, Farmers Insurance, the Catholic Medical Center, and Teleglobe.

## DB2 "Viper 2" V9.5 – +200% XML Data Transactional Performance

Maintaining its tremendous pace of major data server advances of recent years, IBM announced *(October 15th, 2007)* and shipped *(October 31st, 2007)*, the DB2 "Viper 2" V9.5 next major DB2 data server release *(for distributed server platforms)*, after a successful beta test program *(July to October, 2007)*. This important new release builds on the big advances and market success of DB2 V9 mentioned previously, **featuring new data automation and performance enhancements** that greatly improve the way DB2 customers can now store, manage and access business information.

DB2 "Viper 2" V9.5, claimed IBM, offered broad technology advances unavailable from competitors, including new pureXML data management capabilities bringing an up to **a 200% improvement in XML data transaction performance**, and significant storage savings. Early customer testers of the transactional XML feature, combined with DB2 "Viper 2's" deep data compression technology leadership, also reported up to a **500% reduction in the amount of storage space required** to store XML data. Advanced data compression capabilities had already previously been implemented in the mainframe DB2 "Viper" for z/OS V9 release, where they have been available for some time.

DB2 "Viper 2" V9.5 was also claimed to provide the **industry's highest level of automated functionality** – which IBM dubbed "extreme autonomics". Its extreme autonomics enable "Viper 2" customers to ensure availability of critical business data while their data server constantly tunes itself for optimal performance – without human intervention. These enhancements include: **automatic deep compression to save storage capacity and costs** as a customer's database grows; **autonomic memory management** to reduce administrative burdens on database administrators and make better use of physical memory allocations; and **integrated automated failover and backup** to simplify system set-up and minimize downtime. IBM has consistently led the industry with its literally hundreds of specific autonomic computing advances and innovations over this decade, in both its major software products like DB2 here, and on its hardware systems, such as on the System z mainframe and its software subsystems. These advances have produced enormous customer dividends in reduced TCO and support staffing requirements, as reviewed here for DB2.

DB2 "Viper 2" V9.5 also provides the **backbone for IBM's BI and dynamic data warehousing** offerings *(see our IBM InfoSphere Warehouse V9.5 assessment in Section 5, on page 34)*. These help customers improve their ability to manage all types of information and align their data with services, expertise and business-specific models to meet their individual business goals in IOD environments supporting both BI/EPM and new-generation SOA enterprise applications.

This new DB2 version now also includes **advanced compliance features and tools**, modeled on proven audit and encryption capabilities developed on, and already employed by, the DB2 for z/OS V9 mainframe version. Bringing these mainframe-proven increased security and encryption capabilities onto distributed platform versions helps customers *(using those platforms)* remain ahead of threats, and ensures that data management regulations can be met.

*...DB2 "Viper 2" V9.5 further widens IBM's data server technology edge to help customers lower costs as they innovate and grow their businesses...*

**Analyst Comment:** DB2 "Viper 2" V9.5 is the product of IBM's continued, aggressive, wide-ranging effort to break the mould of the data server industry landscape, and to substantially outpace its competitors, which it handsomely achieved with DB2 "Viper" V9's striking success on all platforms, including mainframe z/OS. Extending this technology, performance, and TCO economic value leadership, DB2 "Viper 2" V9.5 further widens IBM's data server technology edge to help customers lower costs as they innovate and grow their businesses by exploiting Big Blue's comprehensive IOD strategy. Customer interest and adoption has proved high, and rapid, in the half-year since this release.

We found the strength of IBM's dynamic warehousing offering that is built-out atop this DB2 release – **IBM InfoSphere Warehouse V9.5** *(see page 37)* was also most impressive. It provides an ideal, advanced DW base that can fully power the extensive, new, IBM-Cognos BI/EPM products and solutions *(assessed in Section 4)*. IBM has not yet announced a next, post-DB2 V9 "Viper" for z/OS release for the mainframe platform. It remains unclear today whether the next version will be based on the DB2 "Viper 2" V9.5 *(out for distributed platforms already)* release, or be a "V10" release with some different feature set. We expect this important DB2 release will further fuel IBM's data server and IOD business momentum by helping its customers improve how they manage and extract value from their business information; particularly XML data.

## BI & Dynamic Warehousing on System z – Putting it all Together for IOD

Data warehousing and online transaction processing applications are now starting to blur in the newer age of dynamic warehousing we have entered. Analytic applications must now be driven to provide real-time data access. Operational BI is becoming a dominant marketplace requirement as many more customers push their BI applications out to ever-expanding numbers of end users across their enterprises.

Embedded analytics directly supporting core business processes, inclusion of unstructured data access, real-time access to dynamically-changing, cleansed and consistent data, and powerful IOD tools, are amongst the essential requirements for dynamic warehousing.

The System z mainframe is well-known for its ability to support the high availability *(24x7)* environment required in today's global economy, and especially for the superlative enterprise data-serving the combination of System z-z/OS-DB2 for z/OS. The latter therefore provides an outstanding foundation for enterprise-level dynamic warehousing running co-resident alongside the modern SOA transactional and operational systems also running on System z.

IBM provides a sophisticated dynamic warehouse solution *(IBM InfoSphere Warehouse – covered in Section 5)* which includes the necessary tools to build, maintain, tune, manage, secure, enforce regulatory compliance, and to analyze critical business information. Dynamic warehousing tools and functions on the System z mainframe may be combined with enhanced features on Linux, UNIX, or Windows platforms, to deliver the most extensive range of data warehousing capabilities offered in today's IT industry.

Mainframe specialty engines such as the zIIP, zAAP and the IFL can all be profitably deployed help to improve processing efficiencies and to sharply lower the cost of a System z DW solution. The main IBM software offerings that now underpin dynamic warehousing on System z can now be summarized as:

- **DB2 for z/OS:** The industry's premier data server, in this context the ideal engine for dynamic warehousing on System z-z/OS. Out in DB2 "Viper" for z/OS V9 production release today.
- **IBM InfoSphere Warehouse:** The IBM advanced, dynamic warehousing solution, built-out atop DB2 *(see Section 5 for details)*, and leveraging the advanced DB2 versions discussed above.
- **DB2 Alphablox:** Embeds analytics directly into Web-based applications, included in IBM InfoSphere Warehouse offering.
- **IBM DataQuant for z/OS:** Query, charting, analysis, and dashboards for rapid development and deployment of BI applications. *(Amongst the wide range of IBM DB2 tools fully shown in Figure B1 on page 55.)*
- **WebSphere DataStage for z/OS:** Extends ETL performance to a higher level, with powerful data integration and transformation capabilities for warehouse loading. *(An IBM Information Server module, see Section 5.)*
- **WebSphere Replication Server for z/OS:** Replicates data between DB2 for z/OS and other databases for high availability and nearer real-time access. *(An IBM DB2 tool, see Figure B1 on page 55 for full list.)*
- **DB2 Query Management Facility *(QMF)*:** DB2 QMF is the well-known, long-running, tightly-integrated, and reliable query and reporting tool for the DB2 RDBMS.

We assessed most of these elsewhere within context in this White Paper, as noted above.

## IMS Version 10 – High-performance System z DB/TP Release Bolsters IOD Strategy

IMS remains unsurpassed in database and transaction processing availability and speed, as IBM continues to enhance IMS integration, manageability, and scalability. IMS Version 10 *(IMS V10 here)*, the latest major release of this System z mainframe foundation data-server/TP engine, was announced on October 10th, 2007, and became GA worldwide on October 26th, 2007.

This major new IMS V10 release of IBM's flagship hierarchical database management and transaction system delivers much-enhanced XML and Web services capabilities that enable users to more widely leverage their IMS information to support more informed decision-making. These greatly smooth IMS customers' pathways to exploiting their IMS information as strategic assets. They allow them to extend their existing, business-critical IMS applications to SOA resiliently over the Internet, and to feed IMS data directly into their new IOD-initiative informational applications. In addition, improved information integration/openness, greater manageability, and enhanced scalability for IMS database applications, with traditional IMS security, were the other primary themes of this important IMS advance.

First developed to power the Apollo space program, IMS is a real legend – the IT industry's first modern database and transaction management software. Over three decades, IMS' high reliability, security, scale, and performance, had long made it the backbone for nearly 95% of Fortune 1000 companies *(and thousands more)*. These use IMS for their most critical IBM System z data management and OLTP needs, and over 50 billion transactions run through IMS databases daily, whilst supporting over 200 million end users per day.

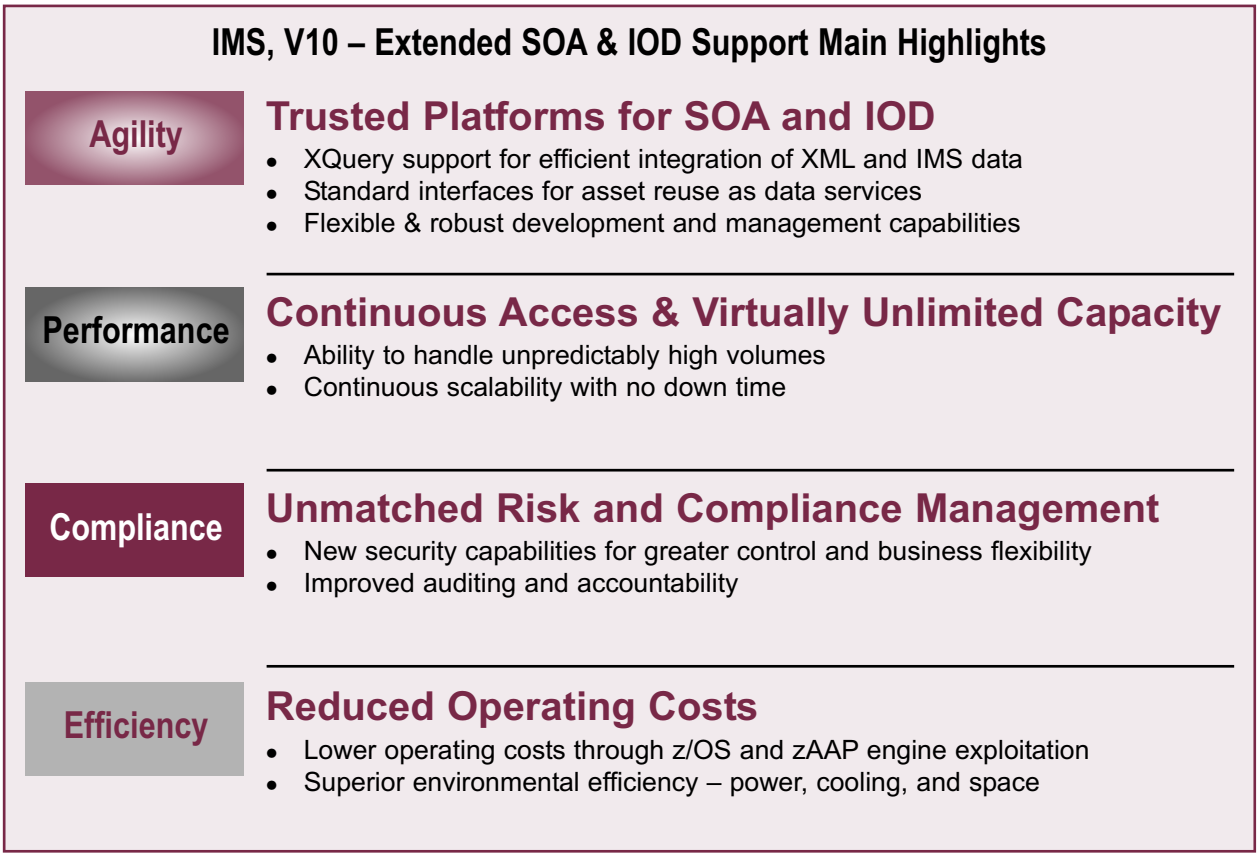


**Figure 15: IMS V10 – Extended SOA & IOD Support Main Highlights**

Figure 15 highlights and summarizes the main advances incorporated into IMS V10, under our primary data-server assessment theme headings of Agility, Performance, Compliance, and Efficiency as follows:

- **Agility:** Improve IMS Integration and inter-operation with IBM and other SOA products and platforms over the Internet, supporting useful open standards, powering IOD, and taking fullest advantage of the latest IBM/industry application development and connectivity tooling.
- **Performance:** Extending IMS' ability to provide continuous access to huge and unpredictable data volumes, with continuous scalability and zero service downtime. In addition, fully exploit the latest System z hardware and software facilities to optimize IMS performance, capacity, availability, and recovery.
- **Compliance:** Extending IMS' outstanding risk & compliance management strengths with new security features offering greater control and increased business flexibility, whilst also supporting improved auditing and accountability.
- **Efficiency:** Cutting user operating costs by extending autonomic computing across IMS, to ease installation/use, eliminate/reduce outages, and to minimize new user IMS learning curves. Also sharply reduce processing costs via exploiting the zAAP specialty engine *(XML parsing, etc.)* and latest z/OS advances. This version allows customers to considerably extend their IMS workloads, whilst exploiting System z's "green IT" environmental efficiency advantages in power, cooling, and space.

IMS V10 featured a range of new technologies and enhancements that alter and improve the way information is stored, managed, and accessed in mainframe computing environments. These include the following new technologies that greatly strengthen IMS-powered mainframe SOA and IOD initiatives:

- **New XQuery, Enhanced XML & Web services Support:** Provides standard XML Query language access to hierarchically structured IMS data for the first time. This opens up IMS data to off-the-shelf, third-party tools *(e.g. query generation)* whilst offering a standard, shareable integration point between IMS and other industry databases.
- **Broader XML and Java Tooling:** Encourages new application development and expands connectivity by supporting open standards such as Web 2.0, XML, SOAP, Java, and JDBC. These help customers simplify their development environments while they continue enjoying IMS' proven performance and data integrity benefits.
- **Dynamic Resource Definition:** Eases manageability, simplifying installation and operations, which reduces tTCO.
- **Enhanced Database Recovery Control, Multiple Systems Coupling and Security:** These advances include higher scalability with more parallelism in IMS Database Recovery and Sharing Control *(DBRC)*, and improved performance/capacity in Fast Path, IMS High Availability Large Database *(HALDB)*, and database utilities. On the IMS TP side, they include more scalability with wider bandwidth for Multiple Systems Coupling, and improved system availability, performance, and capacity in workload balancing.
- **IMS SOAP Gateway:** This Gateway enables IMS transactions to be presented as Web services, for interoperation with client applications independent location, programming language, and platform. Now enhanced in V10 to provide z/OS environment, PL/I applications, and Asynchronous Callout support. Existing IMS support for COBOL applications and for Windows, AIX, and Linux on System z client environments is continued.

IBM offers an extensive suite of IBM IMS tools and utility software products, currently numbering 46 products, all supporting IMS V10 from its GA, and these are shown in Figure B2 of Appendix B, on page 56. Several significantly-enhanced tools are included there, and the portfolio now provides a rich collection of productive tools that complement all aspects of IMS use.

*This premier System z mainframe data server/TP system is now well equipped to extend the value of its customers' IMS workloads in many valuable new directions through 2008.*

**Analyst Comment:** IMS has long earned its distinguished place in the IT industry's software hall of fame as the first, most-respected, and longest-lasting hierarchical database management and TP system, optimized for many of the largest and most demanding commercial transaction processing applications. Over recent years and through IMS releases *(V8 V9, and now V10, included)*, IBM has heavily re-invested in IMS, and its extensive, supporting IMS tools portfolio. This investment enabled this veteran OLTP DBMS/TP system to integrate easily, and play efficiently, in today's new enterprise IT world of open standards, SOA, and IOD. It has also enabled its newer IMS releases to work equally with newer programming languages *(e.g. Java)* and their tools, and to integrate with newer applications styles *(SOA composite, Web 2.0., IOD, and BI/EPM, etc.)* now in widespread use. In addition, IBM has continued to refine, enhance, and extend classic, core IMS areas of performance, capacity and scalability, availability, security, and manageability, whilst exploiting new System z hardware advances. This premier System z mainframe data server/TP system is now well equipped to extend the value of its customers' IMS workloads in many valuable new directions through 2008.

## The IMS SOA Integration Suite

IMS SOA Integration Suite is a versatile collection of IMS middleware functions and tools that support IMS SOA applications, enable users to modernize existing IMS applications, and help to integrate IMS into distributed applications. IMS technologies for connectivity, data representation, application development, Web access to IMS data and applications, and ad-hoc queries against IMS databases are all offered within the IMS SOA Integration Suite.

Users' existing IMS skills, investments, and technologies can thus be used to extend existing IMS applications to customers over the Web without any coding, for example. The Suite can also provide access to IMS transactions and data from any Web connection. IMS applications, and their core business logic, can also be made to interoperate with other clients, such as Microsoft .NET or SAP, or with composite applications, under an SOA. Users can now develop for IMS using Java, instead of PL/I, COBOL, or Assembler; reducing development time/cost. The Suite can also enable direct IMS data access from other System z subsystems, including DB2, CICS, and USS. Finally, the Suite permits XML content to be directly stored in IMS without any intermediate steps, which can exchange data with other systems using established schemas. Specific facilities provided by the Suite for access to IMS transactions include:

- **IMS SOAP Gateway:** An XML-based connectivity component, enabling existing or new IMS applications to communicate outside of the IMS environment using SOAP.
- **IMS Resource Adapter:** An IMS component that allows the rapid creation and running of Java applications which access IMS transactions over the Internet. *(Also known as the IMS Connector for Java.)*
- **IMS MFS Web Solutions, IMS MFS SOA Support, & IMS MFS Web Enablement:** Provide support for reusing existing MFS-based IMS business logic.

Specific facilities provided by the Suite for access to IMS data include:

- **IMS DB Resource Adapter Solutions:** IMS function allowing a programmer with minimal IMS knowledge to write Java application programs that access IMS databases. *(Formerly known as IMS JDBC Connector.)*
- **IMS DLIModel Utility:** Uses IMS source files to generate metadata for use with Java application development. The utility also allows users to modify that metadata, generate XML schemas, import additional field information from COBOL copybooks, and write DLIModel trace logs.
- **IMS XML DB:** Allows applications to view traditional IMS DBs as XML databases. Using the IMS DLIModel utility above to construct an IMS-to-XML mapping, IMS XML DB allows storage and retrieval of XML documents from existing or new IMS databases. IMS XML DB currently runs as a Java application running in IMS, CICS, DB2, or WebSphere.

*This Suite provides a helpful set of utilities and functions to enable IMS to fully participate in an SOA environment...*

**Analyst Comment:** This Suite provides a helpful set of utilities and functions to enable IMS to fully participate in an SOA environment, providing simpler means of accessing IMS data and transactions from other environment. The Suite will be invaluable to IMS customers extending the use of the IMS platform to the Web under an SOA and/or implementing IOD initiatives touching IMS.

## IBM Content Management V8.4 Bolstering IBM ECM Portfolio

New ECM offerings, the IBM Content Management V8.4 software family releases, were announced on October 15th, 2007, providing improved performance, scalability and usability to IBM Content Management users. The releases also help improve users' contents-associated business processes, better manage, access and integrate critical business information, and enable more cost-effective compliance, whilst protecting existing customer content investments. This family is at the heart of IBM's extended ECM solutions portfolio, providing ECM services for many of IBM's largest customer installations.

Now *(after IBM's $1.6B FileNet acquisition)* the advanced IBM FileNet Records Crawler and the IBM FileNet BPM capabilities may be integrated with IBM Content Manager V8.4. Records Crawler automatically monitors specified locations for documents matching defined rules, applying processing rules, and capturing file system content into IBM Content Manager, helping customers manage Windows file system content, whilst lowering cost and reducing risk.

IBM FileNet BPM improves process performance, reduces cycle times, and improves productivity/decision-making, by automating, streamlining and optimizing content-centric processes. IBM ECM thus now combines these BPM capabilities with content management, to activate content in applications, and to execute event-driven, information-related decisions/processes. IBM's enhanced Content Management V 8.4 product family comprises:

- **IBM Content Manager for z/OS V8.4*:** IBM's strategic, reusable, open content management platform offering customers a choice of ECM approaches, plus flexible installation and deployment options. It offers an easy-to-use Web client, allowing users to access documents from the V8.4 repository. This Web 2.0 and AJAX-based infrastructure brings a flexible, dynamic ECM work environment. Its easy-to-use, interactive interface helps improve user productivity, and advance enterprise-wide connectivity and information access. *(*System z mainframe – V8.4, distributed servers – V8.4.)*
- **IBM Document Manager V8.4:** Now with enhanced integration to IBM Content Manager, this component is for customers requiring an advanced document management product to improve productivity, and to-cost effectively manage the whole lifecycle of compound business documents, over product or project lifecycles. *(Windows client to IBM Content Manager for z/OS V8.4, or distributed servers, or to IBM FileNet P8.)*
- **IBM Content Manager OnDemand for z/OS V8.4*:** Today's market-leading Enterprise Reports Management *(ERM)* solution. Provides high-volume computer output capture and automated output storage management. Many common functions can now be performed via the new, Web-based system administration browser client. New LDAP support allows customers to manage basic login authentication directly on the server, exploiting 64-bit-enabled address space for increasing performance. New cabinet support now lets users' organize folders into electronic cabinets, simplifying folder structure navigation. *(*System z mainframe – V8.3, distributed servers – V8.4)*

- **WebSphere Information Integrator Content Edition *(IICE)* V8.4:** New versions of connectors continue IBM's real-time content integration to unstructured content leadership, now supporting over 20 "out-of-the-box" connectors to leading content management repositories. Performance improvements speed access to third-party repository content, often improving customer service applications responsiveness. Base capability enhancements support new operating systems, new Internet standards, and important accessibility features. With IICE, clients can implement the content-centric integrations, protecting and exploiting existing content stores and content-centric applications investments. *(Distributed UNIX or Windows servers.)*
- **IBM CommonStore V8.4:** Helps cut operational costs arising from growing e-mail/electronic messaging data store sizes, while helping manage e-mail/electronic messaging to ensure compliance. This release adds support for Lotus Domino 8.0 and Microsoft Exchange 2007. CommonStore e-mail search feature enhancements improve e-Discovery support; e.g. by improving case folder performance, by removing .pst and .nsf export file size limitations, and by now supporting IBM Records Manager hold/release. *(AIX5L or Windows server-based product.)*
- **IBM WEBi V1.02:** Customers can lift their productivity plus gain competitive edge by giving staff this intuitive Web browser, enabling them to efficiently locate/access internal content. This browser tool *(based on advanced Web 2.0 technologies, including AJAX and DOJO, and open standards)* enables more users to directly access content and ERM output, allowing them to easily use, combine and reuse that content for improved business value. It speeds user access to company content information, helping better-founded decision-making. *(Desktop client.)*

The above product releases that comprise this family were made available on the dates shown in brackets after each name in the following list: IBM Content Manager for z/OS V8.4 *(December 14th, 2007)*; IBM Document Manager V8.4 *(December 14th 2007)*; IBM Content Manager OnDemand for z/OS V8.3* *(September 30th, 2004)*; IBM CommonStore V8.4 *(November 30th, 2007)*; and IBM WebSphere Information Integrator Content Edition V 8.4 *(December 18th, 2007)*. Thus, all these family members became available by end 2007.

*This powerful IBM ECM software family fully supports IBM's IOD initiative...*

**Analyst Comment:** This powerful IBM ECM software family fully supports IBM's IOD initiative, which aims to provide customer users with data exactly when and how they need it to improve their business processes, quickly respond to market needs, and rapidly identify new business opportunities. The IBM Content Management family also now leverages IBM's FileNet acquisition, by harnessing and integrating the capable IBM FileNet Records Crawler, and IBM FileNet BPM, capabilities.

## Our Analysis

In Section 6 above, we evaluated and assessed the latest developments in IBM's powerful enterprise data-servers and ECM software for the System z mainframe that are that platform's IOD foundation and underpinnings. Major new releases of the IBM System z data servers extend their leadership, incorporating substantial advances in SOA and IOD support, plus the many other important enhancements detailed above. The IBM ECM portfolio has also been greatly broadened *(with content-centric BPM especially)*, and a substantial new IBM Content Management family set of releases delivered

From March 2007, DB2 for z/OS V9 was a huge landmark, bringing the breakthrough of unified, hybrid SQL and XML database technology to the mainframe platform as a prime foundation for modern SOA applications and IOD. This major release also brought with it many other significant advances, especially the welter supporting dynamic warehousing and its underpinnings for enterprise-level BI/EPM. Well-received, and rapidly-adopted by existing customers, DB2 V9 overall pulled IBM well ahead of its database competitors from late 2006 to date, and justly given IBM a major boost in database market share, competitive wins, and new-name customer gains.

Now, DB2 "Viper 2" for z/OS V9.5 *(already successful on distributed platforms)* is nearing its expected Q2 2008 ship-date. It will continue and extend the above major V9 advances considerably further, with enhanced XML performance, extensive further dynamic warehousing support, additional SOA enablement, and a host of other manageability, security, availability and other advances. The scale and depth of these should leave all mainframe DB2 users in no doubt that this flagship, premier IBM data server platform is again absolutely at the heart of IBM's data server, SOA and IOD development plans and priorities. The huge IBM portfolio of supporting DB2 tools *(see Appendix B)* lends depth and breadth of software support for every aspect of best running this engine.

The latest available IBM V10 major release took another giant step to extend and complete the process substantially begun with IMS V9.0 of opening up this champion mainframe high-volume, high-performance OLTP DB/TP environment to the new world of SOA composite applications. It now allows first-class participation both ways by IMS data and transactions in SOA application solutions through open SOA standard facilities. IMS support for modern Java development was another welcome move, along with a substantial raft of general manageability, performance, availability and compliance advances. IBM also brought together and packaged the whole collection of functions and utilities for IMS integration that have been added in recent years, as the unified IMS Integration Suite, a wise move. IMS is also well supported by IBM's extensive IMS tools suite *(shown in Appendix B, Figure B2)*.

Start with data server advances and with the major hardware advances of the new System z10s. Add in the hugely improved data-serving economics from the zIIP, zAAP, and IFL specialty processors, and from enhanced hardware price/performance. Further add in the effect of steady mainframe software value-enhancement. The result, we found, is that the mainframe's enterprise-wide data-server role at the heart of SOA and IOD initiatives is clearly central and is economically justified.

Similar arguments apply also to ECM, where the IBM Content Management family has been extended and enhanced with the recent V8.4 releases and by integration of these long-established, in-house IBM ECM leader products with components from the FileNet acquisition.

# Appendix A: Massive IBM ISV Acquisitions Program Extends IOD Portfolio

## Introduction

IBM drove a five-year-long development program backed by extensive, original R&D, a major product line expansion, and one of its most high-powered marketing roll-outs, for its **Information on Demand** strategy and product portfolio *(launched in February 2006)*. IBM's investments included both a sustained, major, internal R&D and product development effort across all of its existing Information Management product areas, together with a huge program of complementary ISV acquisitions across the IOD space, and their close integration into what is now a comprehensive, innovative, and powerful IOD portfolio. In our assessment, this IOD portfolio is now clearly much the strongest IOD offering in this broader IOD market that now melds many, previously discrete, information management market segments.

## 25 IBM IOD Software Firm Acquisitions 2001-2008 to Date

We identified 25 ISV acquisitions made by IBM, specifically to support, extend, enrich, and enhance, its IOD strategy and portfolio, between 2001 and end-February 2008 *(time of writing)* alone. IBM's Software Group has long followed an effective strategy of acquiring ISV firms that offer complementary technologies, leading-edge skills, and/or established customer bases, in each of IBM Software Group's *(SWG's)* main brand market focus areas. Many were small- or medium-sized ISVs *(often privately and/or VC held)* with innovative and complementary software that integrated well with IBM offerings. Others were much larger, $1B+ acquisitions of well-established major ISV *(generally publicly held)* market segment leader firms, bringing mature products, skilled staff, and established customer bases.

*...25 ISV acquisitions made by IBM, specifically to support, extend, enrich, and enhance, its IOD strategy and portfolio, between 2001 and end-February 2008...*

Most acquired ISVs had previously worked in partnership with IBM, had already built integration of ISV products with IBM IOD foundations, and had usually also worked together with IBM to support common customer footprints. Such close, favorable prior partnership experiences with these ISVs and their products made IBM's acquisition decisions low-risk and their full integration into IBM relatively easy and rapid.

Four of IBM SWG's main, current, branded software operations were themselves each founded and built around large IBM acquisitions *(Lotus Development Corporation, Tivoli Software, Rational Software, with Cognos – whose name is to live on under the IBM-Cognos brand – now the latest.)* These are chronologically listed in Figure A1 *(on page 52)*, with our short profile of what each ISV acquisition brought to IBM's IOD strategy/portfolio. Purchase prices were disclosed only for larger, public firm purchases.

| IBM Software – 2002-2008 TD Information on Demand-Supportive Acquisitions | | | |
|---|---|---|---|
| **Acquired Company** | **Dates Announced, Completed.** | **Price** | **Acquired Company Offerings, Synergies with IBM IOD Strategy** |
| **AptSoft** | January 23rd, 2008. | | • Business intelligence software for complex event processing/analysis that helps companies spot emerging business trends.<br>• Able to analyse tens of thousands of disparate events per second on a network to spot trends, and to enable customers to capture/respond to events as they happen. |
| **Solid Information Technology** | December 21st, 2007. | | • Adds Solid's in-memory database server technology to IBM's IOD disk data server portfolio.<br>• Enables enterprises to access/store data up to ten times faster than using traditional disk-based database systems, and offers faster system recovery benefits.<br>• $14.4M 2007 revenue. |
| **Cognos** | December 2007 January 31st, 2008. | **$5.0B** | • Hugely extends IBM's IOD portfolio with a complete BI/PM top layer in the market-leading COGNOS 8 enterprise business intelligence & performance management solutions suite.<br>• Already tightly integrated with IBM's IOD foundations through years of close partnership.<br>• New, synergistic IBM COGNOS products already announced on 31.01.08.<br>• Cognos, Canada's largest software firm, also IBM's largest-ever acquisition, bringing 4,000 employees, $979M FY 2007 revenues, and 23,000+ customers into IBM. |
| **Princeton Softech** | August 3rd, 2007. | | • Enhanced/expanded IBM's capability to help clients increase data security, data privacy, and data retention.<br>• Lets customers reduce complexity and simplify enterprise data governance by managing and maintaining business application data archives for a broad set of databases, packaged and custom applications. Now offered as IBM OPTIM solutions.<br>• 240 Princeton employees, and over 2,200 customers, joined IBM at the acquisition date. |
| **DataMirror** | July 16th, 2007 September 4th, 2007. | **$161M** | • Provides real-time data integration that allows customers to release their data's full potential without impact on the performance or stability of mission-critical operational systems.<br>• Allows customers to deliver accurate, consistent, timely and contextual information for real-time business environments while supporting initiatives such as dynamic warehousing, SOA, master data management, etc.<br>• 220 DataMirror employees and c. 2,200 customers joined IBM at acquisition date. |
| **FileNet** | August 10th, 2006. | **$1.6B** | • Provides industry-focused, high-value content management solutions that proactively capture/deliver content as part of a business process.<br>• These technologies can be integrated into IBM's SOA Foundation-based capabilities, including business process management and information lifecycle management.<br>• Allows both customers and partners to ensure their content is delivered and utilized in context of their business processes; and to achieve effective compliance, archiving and document retention.<br>• FileNet had $422M *(2005)* revenues, 1,700 employees, and c. 17,000 customers, when acquired. |
| **Webify Solutions** | August 2nd, 2006. | | • Provides industry-specific software and services for building SOA-based composite business applications.<br>• Allows customers to more easily link their business processes together to share data, regardless of the underlying technologies.<br>• Webify buy provided much of the technology now offered in today's IBM WebSphere Business Fabric offering, and brought the 120 Webify staff into IBM. |
| **Unicorn** | May 8th, 2006. | | • Provides software for metadata management, which gives organizations a better understanding of how they can most effectively use data in their business processes.<br>• Enhanced IBM's Information Management software portfolio, accelerating delivery of next-generation metadata capabilities in IBM products.<br>• Technologies and capabilities from Unicom enhanced/enriched IBM's WebSphere Metadata Server metadata and repository platform. |
| **LAS** | March 17th, 2006. | | • Delivered multi-cultural name recognition software, a technology that determines the origin, cultural variations and meanings of names.<br>• Provides an accurate, real-time view into the linguistic and cultural properties of names, enabling companies to better compete in the global economy. |

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| **Bowstreet** | December 20th, 2005. | | • Provides portal-based tools, dashboards, and technology that help companies bring together corporate applications, documents, databases and enterprise information into a single, integrated portal application.<br>• Bowstreet dashboards tools/expertise enabled IBM WebSphere Portlet Factory offering that speeded portal deployment by hugely simplifying custom portlet development.<br>• Furthered IBM's SOA strategy, and provided an important component for its efforts to help clients deliver Information as a Service. The 75 Bowstreet staff joined IBM. |
| **iPhrase** | November 1st, 2005. | | • Uncovers inherent meaning behind a search query, even when key search terms are not employed; allows most relevant data to be delivered.<br>• Strengthens and broadens IBM's enterprise search and content management capabilities, essential components of IBM's Information as a Service strategy. |
| **DataPower** | October 18, 2005. | **$100M** | • Speeds performance of business processes built of reusable, open-standards-based software components *(XML)*.<br>• Builds on IBM's existing SOA capabilities and supports its Information on Demand strategy.<br>• Now marketed as IBM WebSphere DataPower SOA Appliances, which improved performance and security for SOA implementations. |
| **DWL** | August 2nd, 2005. | | • Provides customer integration MDM middleware enabling companies to provide a single integrated view of customer information across applications and businesses.<br>• Extended IBM's leadership in master data management solutions, an important part of IBM's Information as a Service strategy. |
| **PureEdge Solutions** | July 19th, 2005. | | • Develops electronic forms for companies to customize employee interfaces to business applications; enables the capture, process, and display of business data.<br>• Enhanced IBM Workplace and WebSphere Portal, a key part of IBM's Information on Demand strategy. |
| **Ascential** | March 14th, 2005. | **$1.1B** | • Provides data integration software helping companies solve complex and demanding data integration challenges to make better strategic decisions.<br>• Complimented and strengthened IBM's fast-growing information integration business, a key part of the company's Information as a Service strategy<br>• Had c. 900 employees, $271.9M *(2004)* revenues of, and 550 joint customers with IBM at acquisition. |
| **SRD** | January 7th, 2005. | | • Provides identity resolution software to help organizations increase business insight by delivering an accurate view into individuals/relationships in real time, providing associations previously nearly impossible to discover.<br>• Enhanced IBM's analytics product family and supports its Information as a Service strategy. |
| **Venetica** | August 26th, 2004. | | • Provides content integration software that enables customers to gain real-time access to unstructured data sources and links it to existing business processes.<br>• IBM's business integration capabilities, a vital part of the Information as a Service strategy. |
| **Alphablox** | July 14th, 2004. | | • Enables customers and business partners to embed analytics into their business processes, making information available to a wide spectrum of users and applications.<br>• IBM's leadership in the business intelligence space, a key strategic priority for its Information on Demand initiative. |
| **Trigo Technologies** | March 9th, 2004. | | • Enables companies to integrate and centrally manage product information scattered across an enterprise and supply chain.<br>• Strengthened IBM's WebSphere portfolio and information management solutions, a central part of its Information on Demand initiative. |
| **Green Pasture Software, Inc.** | December 17th, 2003. | | • Provided enterprise content management software, closely integrated with IBM Lotus Domino/Notes, enabling customers to electronically develop and manage entire lifecycle of business documents enterprise-wide.<br>• Extended IBM's leadership in enterprise content management, a main part of its Information on Demand strategy. |
| **CrossAccess Corporation** | October 14th, 2003. | | • Helped businesses gain real-time access to mainframe data.<br>• Strengthened IBM's information integration capabilities, a key strategic priority for IBM's Information on Demand initiative. |
| **Tarian Software** | November 4th, 2002.<br>November 15th, 2002 | | • Provided e-records management software, in growing demand from regulated industries such as government and healthcare.<br>• Bolstered IBM's leadership in enterprise content management, a base component of its Information on Demand initiative. |

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|---|---|---|---|
| **Access360** | September 3rd, 2002. | | • Provided of advanced identity management software.<br>• Strengthened IBM's Tivoli identity management software offerings.<br>• 35 customers and 135 employees at time of acquisition. |
| **TrelliSoft** | August 29th, 2002. | | • Added sophisticated storage resource management software, to deal with proliferation of data storage and increase storage resource availability, to the IBM portfolio.<br>• TrelliSoft's 30 employees were integrated into IBM Software Group's Tivoli brand operation. |
| **Informix** | April 24th, 2001. | **$1.0B** | • Provided distributed platform relational database management software.<br>• Doubled the size of IBM's distributed database business, an important component of its Information Management strategy and a main foundation for Information on Demand. |

**Figure A1: IBM Software – 2002-2008 TD IBM's IOD-Supportive Acquisitions**

## Our Analysis

Just on the five, larger, publicly-disclosed price, IOD-supportive acquisitions listed above alone, IBM spent $8.7B. IBM's 25-ISV buying program must thus surely now exceed $10B in IOD acquisitions investment. On top, we should add five years of IBM's major, internal IOD R&D efforts from its now-35,000-strong Information Management division *(of IBM's SWG)*, which have been sharply ramping up over the last five years. Combined, IBM must by now have invested of the order of $15B in total to bring the firm's whole IOD strategy, product portfolio, and extensive services offerings set, to the advanced state of fruition it has reached today. This has been a truly visionary, impressive, and sustained tour-de-force. IBM has now delivered a stunningly broad and innovative IOD portfolio that offers immense benefits and new value that every enterprise IT user in the world *(and most SMBs)* needs and wants.

*IBM's 25-ISV buying program must thus surely now exceed $10B in IOD acquisitions investment.*

We included this Appendix A, and our somewhat detailed Figure A1, in this White Paper to highlight and illustrate the scale of this huge investment, and to pinpoint some of the innovative ISV product/technology sources that have been melded to deliver today's winning IBM IOD portfolio. Specific contributions from some of these ISV acquisition products to the corresponding new-generation IBM IOD products are noted in a few cases.

# Appendix B: IBM System z Database Tools for DB2 & IMS

## Introduction

The long-established System z mainframe DB2 and IMS database environments that are the heart of the mainframe's enterprise-wide data-serving and IOD hub role are rich, mature, highly-optimized, secure, high-performing, and recoverable enterprise DBMS environments, capable of delivering high-volume workloads with consistently excellent QoS. Beyond the powerful strengths of these world-leading database server engines on the flagship mainframe z/OS operating system themselves, each is supported by now-extensive, continually-extended, modern, good-value suites of IBM database tools that have been extended by leaps-and-bounds over this decade. These database tools cover all the main categories needed to optimize the support and management, and increase DBA staff productivity, of these foundation data server engines, in categories including:

- **Application Management.**
- **Backup and Recovery Management.**
- **Database Administration and Change Management.**
- **Data Governance.**
- **Data Replication.**
- **Performance Management.**
- **Transaction Management.**
- **Utilities Management.**
- **Version Upgrade Acceleration.**

In addition, DB2 for z/OS specifically is also supported by a powerful set of **BI and Dynamic Warehousing software tools**, which we already covered specifically in Sections 5 and 6 because they were central to our IOD on System z focus.

## DB2 for z/OS Tools

IBM offers a now-comprehensive portfolio of modern DB2 tools on z/OS that support high-productivity database administration and change management, backup/recovery and performance management, application management, data governance, and data replication and utilities management

Versions of all these tools were aligned for, and now support, the DB2 *("Viper")* for z/OS V9 current production DB2 release, and will also support the upgraded DB2 "Viper 2" for z/OS V9.5 latest version when that becomes available in mid-2008. These DB2 tools play a major part in supporting, building, optimizing, and managing the customer's whole DB2 database and applications infrastructure on their System z mainframes cost-effectively and productively. This extensive DB2 for z/OS tools portfolio adds greatly to the strength of the complete DB2 offering on the platform, as can be seen from Figure B1, which names all the current DB2 for z/OS tools now available in early 2008, by the categories above.

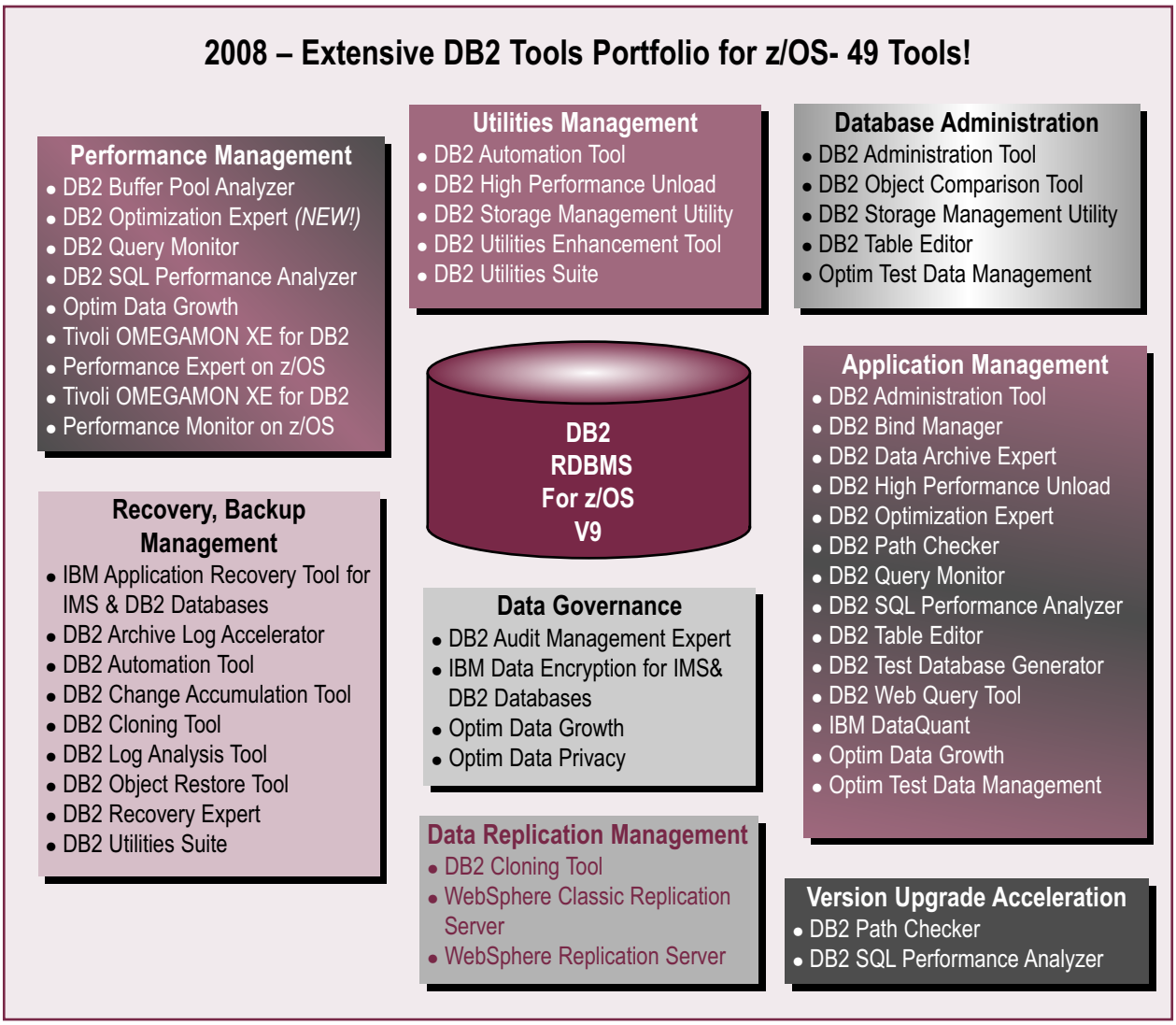


**Figure B1: 2008 – Comprehensive DB2 for z/OS Tools Portfolio – 49 Tools!**

## IMS Tools

IBM's longstanding and comprehensive range of IMS tools provides IMS database administration and change management, application management, performance management, recovery management, transaction management, utilities management, replication, services for IMS system optimization, plus tools for data governance, and for upgrading between IMS versions. These increase staff productivity in supporting IMS data/TP servers and their applications more easily, and at lower cost. OMEGAMON XE for IMS, for example, provides advanced performance monitoring for IMS environments and applications, a fruit of the 2004 IBM acquisition of Candle Corporation. The IMS tool suite products were all aligned and supported the latest IMS Version 10 from day one of GA, enabling customers to immediately exploit the significant advances included. Figure B2 *(on page 56)* shows the names of the now-46-strong IMS tools portfolio, by the above category, now available in early 2008.

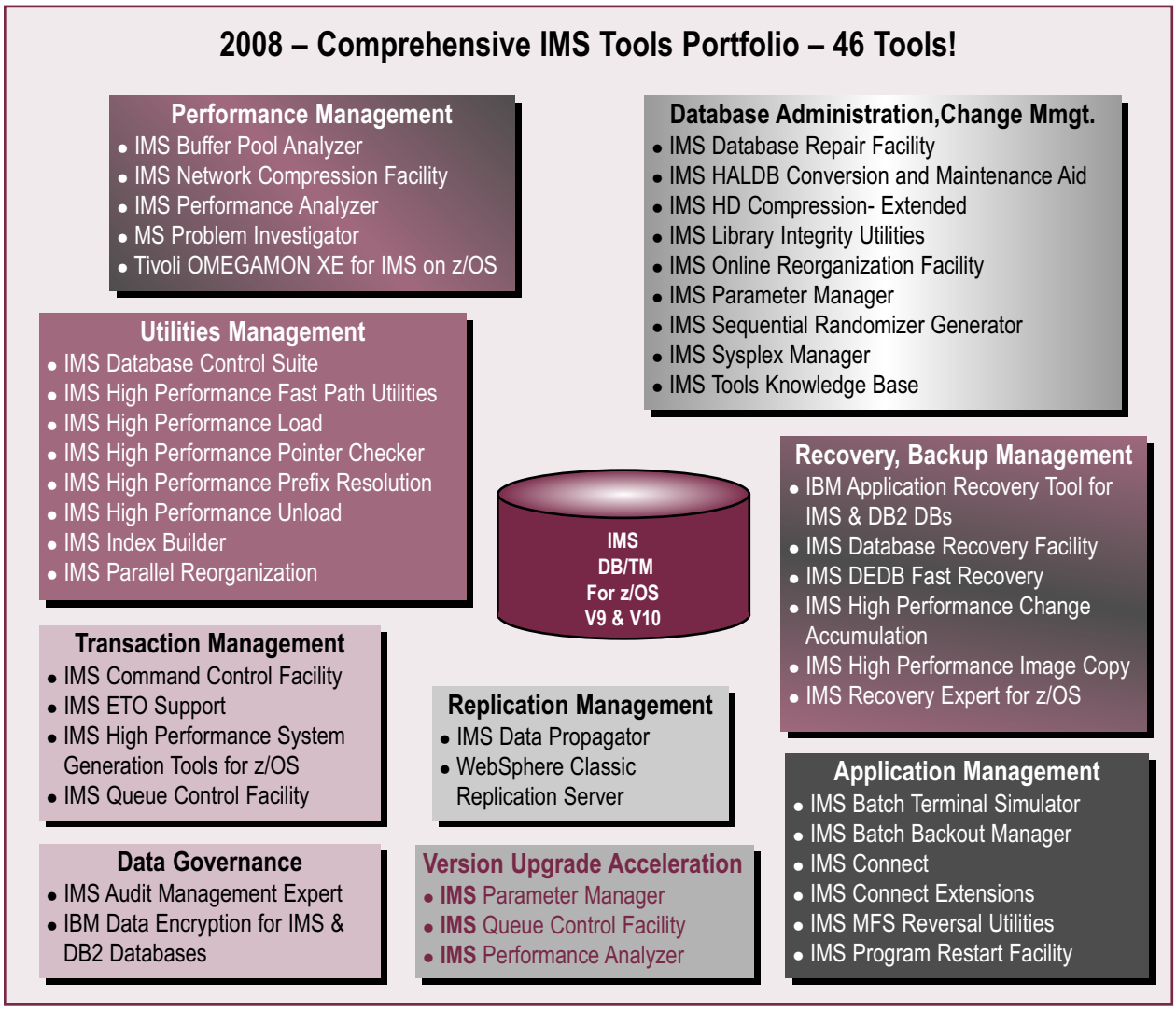


**Figure B2: 2008 – Comprehensive IMS Tools Portfolio – 46 Tools!**

## Our Analysis

With this combined portfolio of 95 DB2 and IMS database tools supporting its central System z data servers, IBM has now built out a tremendously rich, advanced, and comprehensive supporting tools and utilities collection. This raises DBA productivity, simplifies complex tasks, secures, backs-up or recovers, optimizes, and helps manage, customer's DB2 and IMS database environments that are at the heart of their enterprise IOD initiatives. All support the most recent data server releases from day one, and IBM additions and major enhancements to the portfolio continue yearly. IBM has completely transformed its competitive position to one of dominant leadership, far from the weak and lagging mainframe database tools place it held c 1998. *(Compared with, for example, BMC Software – a prime competitor back then.)*

*IBM has completely transformed its competitive position to one of dominant leadership...*

# Appendix C: IBM IOD – Other Recent Product Developments

## Introduction

IBM's IOD strategy is wide-ranging, many-faceted, and had been developed, extended, and deployed rapidly since its launch in February 2006. This was greatly aided by the extensive string of 25 IBM IOS acquisitions detailed in Appendix A. We assessed the major new and enhanced core components of IBM's 2008 IOD portfolio in this White Paper's main Sections 4, 5 and 6. However, there were too many powerful, interesting, and often new, other IOD product offerings, components and solutions for us to cover all uniformly there. In this Appendix C, we therefore review and evaluate just a selected subset of what we regard as other important, and/or especially interesting, IBM IOD products.

## IBM WebSphere Metadata Server, an IBM Information Server Module

Such important business initiatives as regulatory compliance, risk management and BI/EPM require organizations to define where information comes from, how it relates to other information, and when and how it was derived. This has sharply raised the importance of metadata, the attributes that define the content, context, relationships, and structure of information. IBM's new IOD metadata services infrastructure was designed to allow metadata to be more easily managed, be readily accessed by those who need it, and be shared across heterogeneous technologies through an SOA.

To provide these important capabilities, the IBM WebSphere Metadata Server provides "metadata management as a service" to products within the IBM IOD product suite *(including the IBM BI/EPM, MDM, and the other Information Platform offering above)* and also to the IBM SOA Foundation product portfolio. The product is based on the open Eclipse Modeling Framework platform.

*This Server provides the industry's first unified repository architecture for data integration...*

**Analyst Comment:** This Server provides the industry's first unified repository architecture for data integration that is able to deliver dynamic, and shared, metadata across the complete IBM IOD product portfolio. This means older approaches of metadata import/export between main product tools are not required within the IBM IOD suite. Here, for the first time, all the metadata information held is made directly visible within the tools from the IBM WebSphere Metadata Server. We assess this as a genuinely major advance that, in conjunction with the IBM Metadata Workbench below, makes IBM the clear information management/IOD metadata leader.

## IBM Metadata Workbench, an IBM Information Server module

On June 29th, 2007, IBM introduced the IBM Metadata Workbench, a new Web-based metadata visualization, navigation, and management module *(within the IBM Information Server)* that delivers important insights about data, and speeds the deployment of SOA, compliance, BI and MDM integration projects.

Metadata is information embedded within data that describes its important attributes, such as where it came from, what it means, where it has been, and how it can be used. Metadata is also now obviously an important element for compliance initiatives, information integration efforts, and for all forms of electronic discovery for the Web. With this growing dependence on metadata, IBM developed this new IBM Metadata Workbench tool to help IT and business users to better manage this complex but important new resource.

This IBM Information Server module is a metadata management tool that visually shows relationships among data sources and data users. It also provides the proof of data lineage required by many compliance regulations. This new tool makes it much easier to centrally manage/visualize metadata *(for reporting and development projects relying on such critical information embedded in data)*, rather than the traditional approaches where metadata is typically scattered, stored and managed in a variety of tools/technologies. It can also be used to highlight data-change-impacts of changes to any information asset, including which reports, databases, or services would be affected if that data change were made. For BI projects, it traces right back to original sources the result data shown in leading BI reporting tools, showing exactly how that results data was derived.

The Workbench can also extend this metadata visibility across IBM Information Server modules out to external third-party tools as well, including leading data modeling and BI tools, allowing complete end-to-end metadata visualization. It also enables users to create new metadata objects within the IBM Information Server, link together metadata relationships, and to clean up issues/problems encountered in the metadata directly.

**Analyst Comment:** With this extensive visualization and navigation of metadata, IBM claims that its IBM Metadata Workbench is the first to offer this deep level of design and operational metadata visibility and management across all the data modeling, profiling, quality, ETL, and information delivery, phases of the data lifecycle. When used with its IBM WebSphere Metadata Server run-time counterpart mentioned above, we consider that the IBM Metadata Workbench has radically extended the state-of-the-art in metadata management across IBM's whole IOD portfolio with this powerful Workbench and Server combination. The IBM-Cognos BI/EPM tools detailed in Section 4, as well as leading third-party BI/EPM and ETL tools, can readily access and leverage these powerful IBM IOD metadata management and delivering software capabilities. This brings considerably superior metadata integration for customers, both across the whole IBM IOD portfolio and with other supplier offerings that the product exploits.

*...IBM Metadata Workbench has radically extended the state-of-the-art in metadata management across IBM's whole IOD portfolio...*

## WebSphere Business Glossary for Linux on System z; an IBM Information Server Module

The WebSphere Business Glossary enables users to create, manage and share an enterprise vocabulary and classification system that provides a common language between business and IT. The product offers a dedicated, Web-based user interface for creating, managing, and sharing this controlled vocabulary. Terms set up should represent the major information concepts of the enterprise, and categories are used to organize these terms into hierarchies.

Using this IBM Information Server for System z module functionality, administrators assume ownership of business metadata. They can import stewards terms from external sources, create and edit terms in the Web interface, and relate these business terms to any of the more technical artifacts managed by the WebSphere Metadata Server for Linux on System z *(another IBM Information Server for System z module.)* Any of these terms, categories, and artifacts may also be annotated.

Needs around business metadata differ from one enterprise to the next. For this reason, there is no "one-size-fits-all" meta-model. In addition to being able to customize the entry page to the application, administrators can extend the application with custom attributes on both business categories and business terms.

As the quality of this enterprise glossary's classification and set of terms increases, communication about information, and locating the underlying data covering common business terms, becomes faster, easier, and semantically more accurate. Users can help by collaboratively extending and enriching the glossary as their usage prompts, via feedback to the responsible administrator. Glossary updating accountability and responsibility can be assigned according to enterprise data governance protocols.

**Analyst Comment:** Developing and deploying a cohesive, enterprise-wide, controlled vocabulary and classification is an essential part of enterprise metadata management, and greatly helps unlock more meaningful access to IOD across the organization. The WebSphere Business Glossary for Linux on System z module provides a powerful, easily usable, and flexible means to create, extend, and maintain such a glossary. This is ideally held centrally on a System z mainframe hub for widest enterprise access, using the lower-cost z Linux environment to avoid added z/OS operational costs.

## New IBM DB2 Warehouse Performance Management Suite* – Optimizes BI/DW System Utilization

IBM's DB2 Warehouse Performance Management Suite*, announced on November 28th, 2007, provides advanced reporting and analysis of data and system utilization that helps enterprises more quickly and easily deploy, manage, and scale their BI and dynamic IBM InfoSphere Warehouse applications, for better performance and with easier administration.

This offering makes it easier for IBM DW users to more fully exploit system resources, leveraging the recently-added, extreme workload management features of IBM InfoSphere Warehouse V9.5. It provides comprehensive, end-to-end monitoring of all aspects of the DW data lifecycle, giving insight on the data movement processes, database and system configurations, and code quality, as well as on user and application behavior. The Suite combines IBM InfoSphere Warehouse's monitoring, deep analytics and performance optimization capabilities with a new DW Performance Monitoring feature built on partner Appfluent Technology Inc.'s non-disruptive query monitoring and workload analysis software.

The Suite was explicitly designed so that enterprises could better manage and support fast growth of their DW environments to handle fast-increasing BI needs across the organization. *(*Note: Renaming to IBM InfoSphere Warehouse Performance Management Suite is expected on next release.)*

**Analyst Comment:** IBM's new Performance Management Suite for its IBM InfoSphere Warehouse customers provides highly comprehensive performance monitoring, optimization, and management capabilities ahead of those offered by other DW vendors. These important new tools enable IBM customers to rapidly improve their DW application and database performance, efficiently manage their BI resources, and to effectively scale-up their DW environment as usage expands.

## Content Analytics Enhances IBM InfoSphere Warehouse Business Insight

On March 13th, 2007 IBM announced new content analytics software designed to help organizations rapidly consolidate and analyze unstructured information such as e-mail, comments, voice and chat communications to deliver new insight into their business. Content analytics is an important new component of IBM's Dynamic Warehousing strategy that enables a new generation of BI capabilities able to provide real-time insight and deeper value from business information.

An advanced content analytics and mining platform, **IBM OmniFind Analytics Edition** extracts meaningful information, identifies valuable patterns, trends and issues which can be used for important business initiatives such as improving customer care, delivering quality insight reporting, and enhancing research and intelligence. The tool extracts and analyzes unstructured information providing trend analysis, delta analysis, automated alerting, drill-down navigation, and semantic search and key word search. It also enables sophisticated entity extraction when working with unstructured content like documents, e-mails, surveys and chat sessions. These advanced capabilities help reveal situations and track changes over time such as causes of customer dissatisfaction or detection of products that may require frequent repairs or a recall.

More than a decade of significant IBM Research and IBM Global Business Services research and field experience in text analytics went into the development of this software that derives deeper understanding and insight from a combination of structured and unstructured information.

The product and **IBM OmniFind Enterprise Edition** can be used together to deliver an overall content discovery solution that combines advanced, secure semantic search with rich mining and visualization, to deliver higher levels of business insight. This software is based on the **Unstructured Information Management Architecture *(UIMA)*** standard that provides an open architecture for connecting applications for entity extraction and text analytics.

**Analyst Comment:** For additional value, users may store information extracted and analyzed by OmniFind Analytics Edition for their dynamic warehouse *(e.g. the IBM InfoSphere Warehouse)* where it can used for reporting, supplementing customer information management systems, or be combined with other information to address business problems. The capability is an important component of the IBM dynamic warehousing solution.

## IBM DB2 Balanced Warehouse Portfolio Expanded

For those customers who prefer a pre-configured, pre-packaged, and pre-tested data warehousing software and hardware solution, IBM has *(for some while now)* offered its range of **IBM Balanced Warehouse** packaged and bundled data warehousing solutions.

IBM's October 2007 IOD announcement saw it introduce enhanced platform support and new models of the IBM Balanced Warehouse. These each provide complete warehousing solutions with pre-configured, pre-tested, optimized combinations of software, hardware and storage, enabling faster implementation times with lower risk, each optimized to meet a defined part of the warehousing requirements spectrum. This end-to-end approach is aimed at making data warehousing solutions easier to deploy, while ensuring that customers can retain the flexibility needed to meet challenging business conditions and IT infrastructure demands, without sacrificing system performance.

These new and enhanced IBM Balanced Warehouse solution offerings are:

- **C1000 and C3000 Balanced Warehouses:** These existing solutions will now additionally support the Windows platform, to make lower cost data warehousing infrastructure available to small businesses and SMBs who have not adopted Linux. *(The existing OS option.)*
- **D5100 Balanced Warehouse:** This new offering, which is designed for high-growth solutions, extends high-availability features with automated failover to support mission-critical applications at a modest price-point, and provides enhanced reliability and serviceability with its new call-home feature.
- **E7100 Balanced Warehouse:** This new offering is optimized for large-scale enterprise DWs. The solution takes full advantage of IBM's industry-leading POWER6 chip technology in System p on the AIX5L UNIX platform, to accommodate higher levels of concurrency as well as significant fluctuations in workload, providing top scalability and performance for demanding enterprise DWs.

**Analyst Comment:** Whilst unlikely to be of interest to committed System z mainframe users, who will normally elect to add data warehousing software onto their mainframe, these bundled packages that blend and combine the latest IBM data warehousing software, hardware, and storage make excellent-value, first-steps for those within the allocated target groups who are seeking a one-stop data warehousing solution.

## Optim Technology Expands IBM Data Warehousing Portfolio for Archiving & Retention

On January 31st, 2008 IBM further extended its IBM InfoSphere Warehouse offering with its recently-acquired Princeton Softech-sourced Optim Data Retention, to create its new "IBM InfoSphere Warehouse with Optim Data Retention" solution.

This solution integrates IBM's data warehousing and archiving software capabilities, allowing businesses to better manage the growth of enterprise data throughout its lifecycle, and to deliver optimal performance and compliance with changing business policies. The new IBM InfoSphere Warehouse offering is based on IBM's DB2 "Viper 2" V9.5 database software, which provides a unique set of innovations to meet growing customer demand for analytics and IOD.

The solution addresses the challenge of how long enterprises should retain the growing volumes of DW information that they are collecting from their business transactions, and when this should be archived off to back-up storage upon expiry of its useful, on-line lifespan. Optim extracts complete business objects *(referentially intact data and metadata)* to provide a complete snapshot of historical business activity for archiving off from the IBM InfoSphere Warehouse here, under policy control.

**Analyst Comment:** The IBM InfoSphere Warehouse with Optim Data Retention solution provides a powerful, easier, and more cost-effective means of managing such information across its lifespan through archiving, reducing online storage costs, improving performance, and ensuring compliance with regulatory data-retention requirements. The IBM InfoSphere Warehouse with Optim Data Retention is due to become available at the end of Q1, 2008.

## New IBM WebSphere Product Center Release, Also Slated for 2008, to Expand MDM Line

The IBM InfoSphere MDM Server *(assessed above in Section 5)* launched the new and enhanced MDM product family from IBM that is reportedly to be further expanded over 2008. Still to come is a new version of IBM WebSphere Product Center, which will become available in summer 2008. Aimed at companies in the retail, distribution, consumer packaged goods, and consumer electronics industries, WebSphere Product Center leverages product information strategically to power enterprise-wide sales, marketing and supply chain initiatives including new product introduction, e-commerce, and multi-channel management. Data from WebSphere Product Center can be exported to, and used by, the MDM Server to bring product data into real-time business processes.

**Analyst Comment:** IBM is keeping up a rapid pace of investment, development and enhancement on all fronts in the MDM segment of its expanding IOD portfolio. In addition to debuting its strategic, multiform MDM offering, the IBM InfoSphere MDM Server, a new release of WebSphere Customer Center *(both assessed in Section 5)*, and a new version of WebSphere Product Center is also promised for 2008. These moves have consolidated IBM's clear market leadership in MDM solutions and services.

## FileNet Acquisition Strengthens IOD Content Management Side

In October 2006, IBM acquired leading content management ISV FileNet in a large, $1.6B, strategic, IOD-enhancing acquisition. On February 17th, 2007, IBM announced major enhancements of, and developments to, the FileNet portfolio, and new associated consulting services.

FileNet products help customers use their information as strategic assets. They help customers ensure that their business information is delivered and used within the right context in their critical business processes. The new release of the flagship product, **IBM FileNet P8 4.0**, enables organizations to capture, manage, access and consolidate all forms of content, improving their ability to automate records management, meet compliance requirements, and to reduce operational risk. This helps customers derive considerably greater value out of unstructured information – the more than 85% of information that isn't stored in a format that can be easily searched or accessed via conventional database software.

IBM GBS *(Global Business Services)* also rolled out expanded **FileNet consulting services** within its global content management services practice that includes consulting and integration capabilities. GBS now has over 1,000 IBM consultants dedicated to content management consulting services on IBM FileNet and IBM ECM solutions, ranging from initial strategy/planning through deployment of enterprise-wide solutions.

**Analyst Comment:** IBM's FileNet acquisition extended IBM's existing, high-end IBM ECM-based market-share-leadership with FileNet's strong, mid-range, distributed server platform-based, and content-centric BPM strengths, to move IBM up into the clear, overall, global number-one share leadership position in content management software. This is an important part of IOD; handing the mass of unstructured data. With our System z focus here, we delve no further into the FileNet offerings, as these are not available for the mainframe.

# Related Software Strategies Mainframe Research

1. **"Mass Distributed Server Consolidation – System z Mainframe Linux-on-z/VM Extreme Virtualization far Outclasses Over-hyped x86/x64 Approaches."** White Paper, January 2008, 72 p.p., 27 charts & tables. *(In-depth study of scale-out distributed computing problems. Discusses how Linux-on-z/VM extreme virtualization enables mass-x86 consolidation onto System z for huge savings.)*
2. **"2007 Strategic Competitive Analysis – Retooling the Resurgent Mainframe for SOA – IBM's z/OS® Problem Determination Tool *(PDT)* Suite Pulls Ahead."** White Paper, New Edition, June 2007, 42 p.p., 16 charts & tables. *(Comparative assessment of five main System z z/OS PDT suites.)*
3. **"Managing System z Mainframe SOA Environments – Strong IBM z/OS SOA Software Advances Key."** White Paper, January 2007, 66 p.p., 26 charts & tables. *(In-depth assessment of System z9 mainframe as prime enterprise "SOA central" platform in 2007. Focuses on "second-generation" SOA adopter issues: securing, managing, and virtualizing enterprise SOA environments.)*
4. **"Top 15 Reasons Users Should Stay On/Upgrade/Move on to the IBM Mainframe."** White Paper, December 2006, 30 p.p., 6 charts & tables. *(Hard-hitting, outspoken short Paper highlighting the 15 Top Reasons users should stay on the System z mainframe platform, or migrate to it.)*
5. **"New System z9 Mainframes Hit Mid-market, Refresh Top End – Powerful New SOA & Data-serving Software Delivers New Enterprise-wide Roles."** White Paper, July 2006, 60 p.p., 21 charts & tables. *(In-depth assessment of System z9 BC & z9 EC mainframes, HW/SW capabilities, TCO leadership, System z SOA middleware stack advances.)*
6. **"Information as a Service Unfolds – System z9 Mainframe/DB2 Premier Data & Information Server for SOA."** White Paper, February 2006, 74 p.p., 30 charts & tables. *(Evaluated IBM's "Information as a Service (IAAS) strategy, product portfolio, and the System z9 mainframe's enterprise-wide IOD/IAAS hub role.)*
7. **"SOA Takes Off – New WebSphere SOA Foundation Extends IBM's Lead with New System z9 Mainframes as the Hub of the Enterprise."** White Paper, November 2005, 56 p.p., 20 charts & tables. *(Assessed case for adopting SOA, and IBM SOA Foundation WebSphere software, methods and services, on the System z mainframe.)*
8. **"Spectacular System z9 Mainframes Leap Ahead with Doubled Power, Enterprise Hub Roles – Virtualization, Security, Availability, SOA & Value Advances."** Enterprise Server Spotlight Report, September 2005, 72 p.p., 28 charts and tables. *(In-depth assessment of IBM System z9 109 mainframe hardware, operating system, middleware, storage, and virtualization capability.)*
9. **"New Power-driven, High-end and Modular Enterprise Storage Systems – Game-changing Server Technologies/Advances Supercharge IBM's Storage Market Leadership Bid."** White Paper, November 2004, 42 p.p., 21 charts and tables. *(In-depth technology assessment of IBM's DS6000 & DS8000 enterprise storage systems when delivered.)*

# About Software Strategies

Software Strategies is a specialist analyst firm focused on enterprise IT platform strategies and issues. Specialist expertise on mainframes, servers, operating systems, and on middleware software/tools, has been our common thread. Since 1997, we have worked closely with numerous industry leaders, including: IBM; Unisys; Microsoft; Intel; Misys; Fidelity National Information Systems; CA; BMC; Stratus Computers; ICL; NetIQ; and others. Many tens of thousands of Enterprise IT users have benefited from our authoritative reports, white papers, and our presentations at scores of IT events, seminars, and conferences.

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This new White Paper was researched/written by Ian Bramley, Managing Director of Software Strategies, and was published in May 2008. The views expressed are those of Software Strategies alone, and are based on our proprietary research. Ian founded Software Strategies in 1997. He is an experienced enterprise infrastructure analyst, has published scores of popular reports and white papers, and has served as a keynote speaker at many industry events. Previously, he was Director of Enterprise Platforms at Butler Group, and Founder/Chairman of the Enterprise NT Management Forum industry group from 1998 to 2001. Previously, he held executive positions with four international software/services vendors over a 25-year prior IT industry career.

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