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Data Management

Easily Deploying Databases on Private Clouds

June 29, 2011   ibm.com/db2/labchats

> Executive's Message

Sal Vella

**Vice President, Development,
Distributed Data Servers and Data Warehousing**

IBM

> Speakers

Chris Gruber
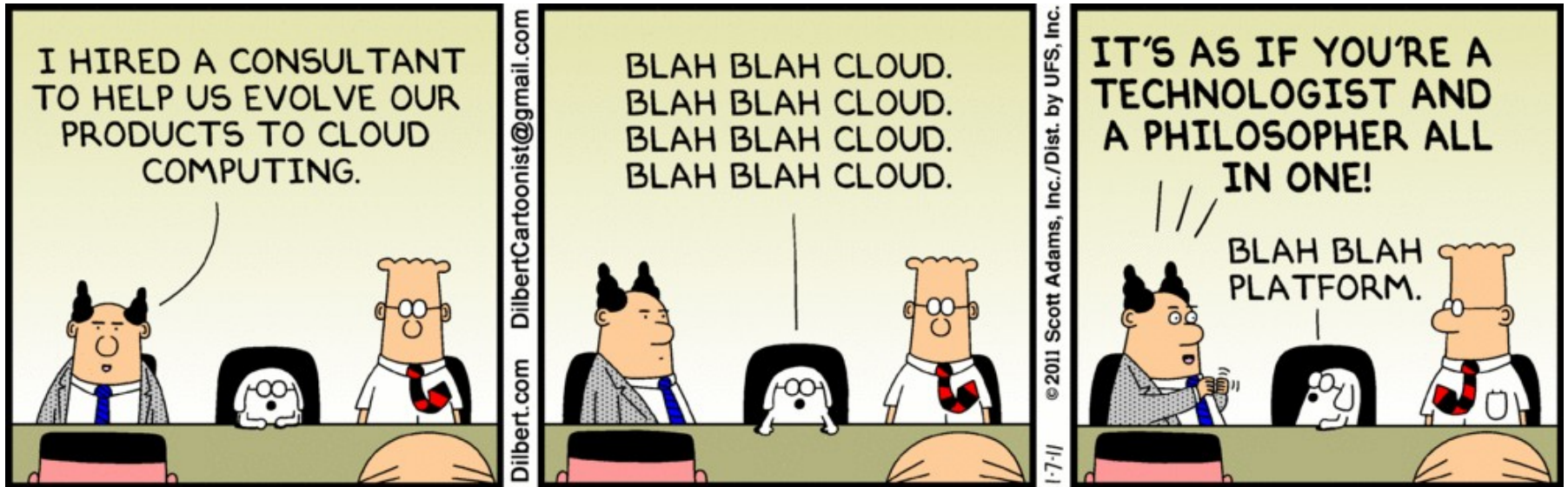
Product Manager,

Information Management

IBM

Leon Katsnelson

Program Director,

IM Cloud Computing Center of Competence

IBM

CLOUD COMPUTING 101

What is Cloud Computing

- **Cloud computing is both a <u>user experience</u> and a <u>business model</u>.**

- **It is an emerging style of computing in which applications, data and IT resources are provided to users as services delivered over the network.**

- **It enables <u>self-service</u>, economies of scale and flexible sourcing options.**

Cloud Computing Essential Characteristics

- **On-demand self-service.**

- **Broad network access.**

- **Resource pooling.**

- **Rapid elasticity.**

- **Measured Service.**

Source: NIST Definition of Cloud Computing v15

Cloud Computing Service Models

- **Infrastructure as a Service (IaaS):**
  - **raw computing capacity**
  - **DB2 focus is on IaaS**

- **Platform as a Service (PaaS):**
  - middleware plus
  - raw computing capacity

- **Software as a Service (SaaS):**
  - computing capacity plus
  - middleware plus
  - applications

Source: NIST Definition of Cloud Computing v15

Cloud Computing Delivery Models
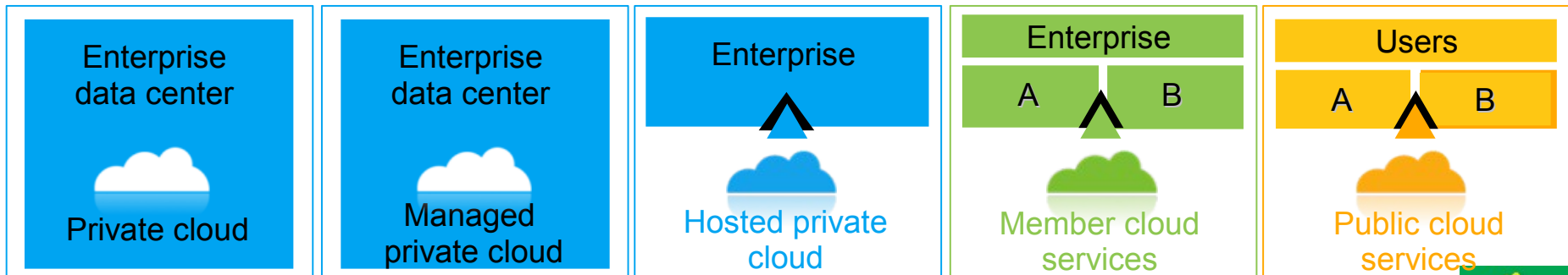
Private

IT capabilities are provided "as a service," over an intranet, within the enterprise and behind the firewall

Hybrid

Internal and external service delivery methods are integrated

Public

IT activities / functions are provided "as a service," over the Internet

Enterprise data center	Enterprise data center	Enterprise	Enterprise		Users	
			A	B	A	B
Private cloud	Managed private cloud	Hosted private cloud	Member cloud services		Public cloud services	

Third-party operated
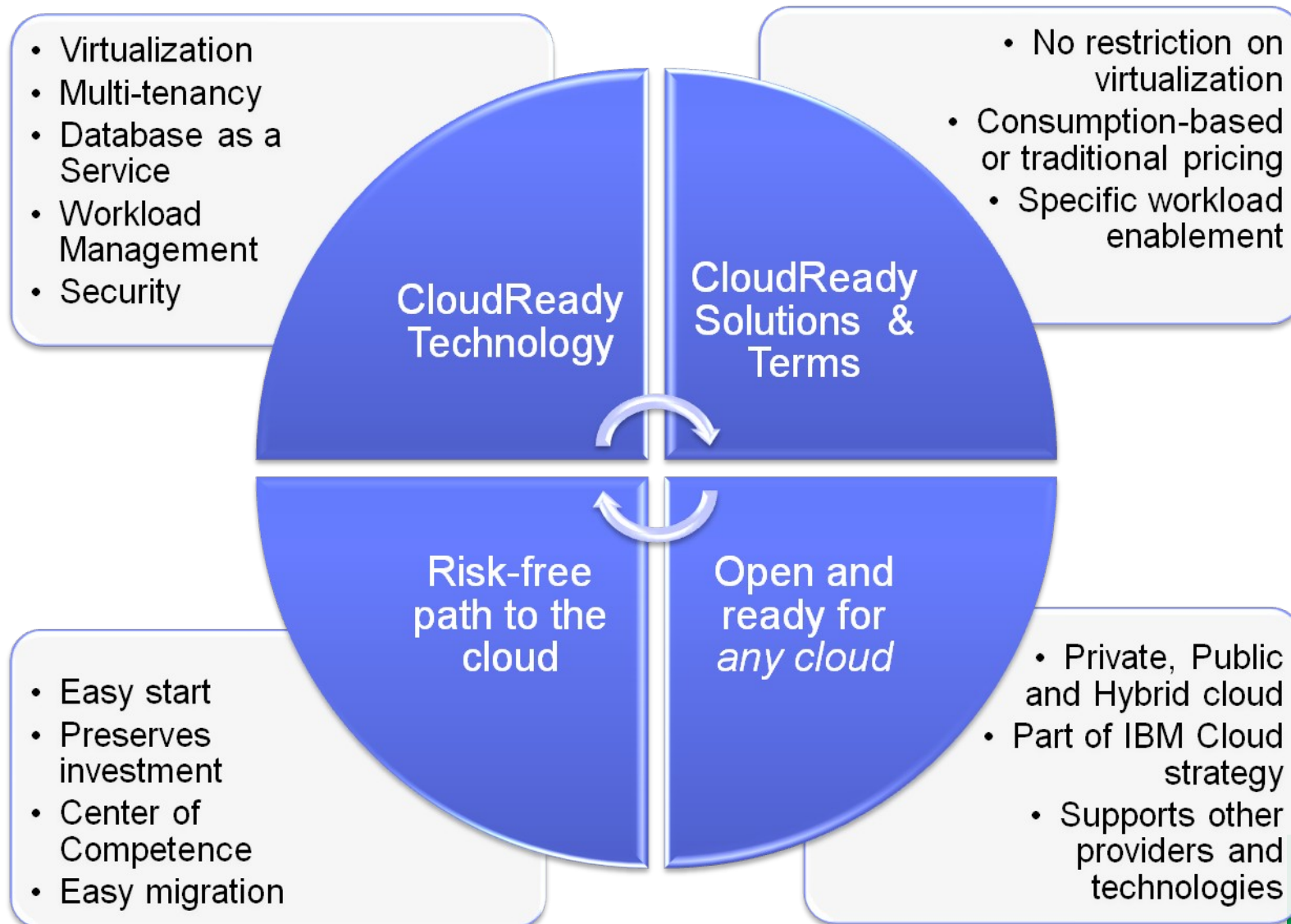
Third-party hosted and operated

Many Reasons to Pursue Cloud Computing

- **Cost reduction**

- **Increasing capital utilization**

- **Agility of IT systems**

- **Developing new lines of business and offering services**

- **Increasing breadth and depth of testing to deliver higher quality applications**

- **Reduce IT resource provisioning and ongoing management costs**

- **Reduce energy use and carbon footprint**

- **Etc.**

DB2 Strategy for Cloud Computing

- Virtualization
- Multi-tenancy
- Database as a Service
- Workload Management
- Security

CloudReady Technology

CloudReady Solutions & Terms

- No restriction on virtualization
- Consumption-based or traditional pricing
- Specific workload enablement

Risk-free path to the cloud

Open and ready for *any cloud*

- Easy start
- Preserves investment
- Center of Competence
- Easy migration

- Private, Public and Hybrid cloud
- Part of IBM Cloud strategy
- Supports other providers and technologies

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What does IBM DB2 has to offer in the Cloud?

Private   **Hybrid**   **Public**

IBM Workload Deployer:
- DB2 HV Images (Linux, AIX)
- Database as a Service (DBaaS)
- IBM Optim Developer & Database Administrator products

RightScale.com:
- DB2 templates
- DB2 + WebSphere deployments
- Windows and Open Source

Amazon EC2:
- Rent DB2 by the hour from Amazon
- Buy DB2 from PPA, rent hardware from Amazon
- Free DB2 use for dev & test

IBM SmartCloud Enterprise
- Rent DB2 by the hour from IBM GTS
- Buy DB2 licenses from PPA, rent hardware from IBM

Enterprise data center	Enterprise data center	Enterprise	Enterprise		Users	
			A	B	A	B
Private cloud	Managed private cloud	Hosted private cloud	Member cloud services		Public cloud services	

Third-party operated

Third-party hosted and operated
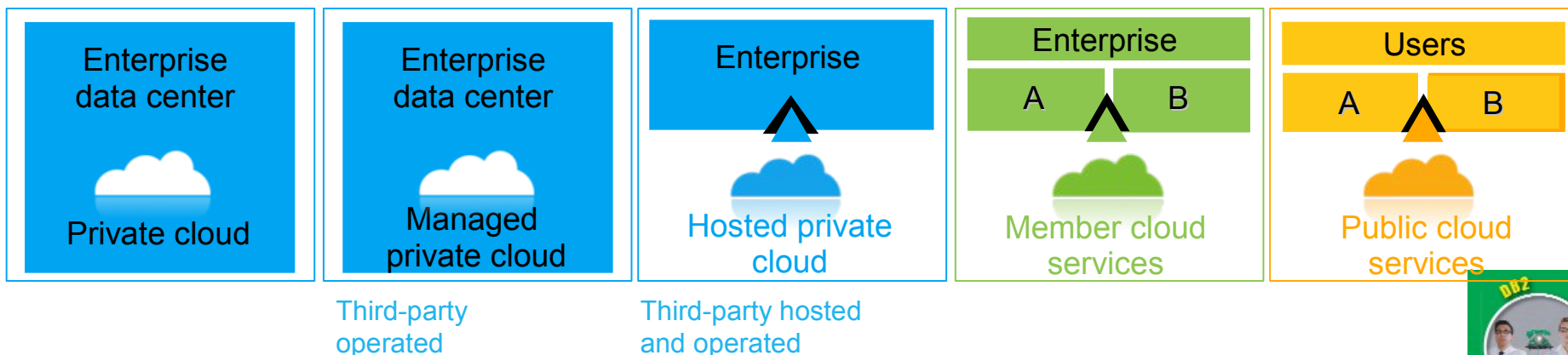
A Crisis of Cost: The Need for Progress is Clear

Global Annual Server Spending

(IDC)

Legend:
- Power and cooling costs
- Management and admin costs
- New system spend

Chart x-axis: 1996, 1997, 1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010

Chart y-axis: $0B, 50, 100, 150, 200, 250, 300
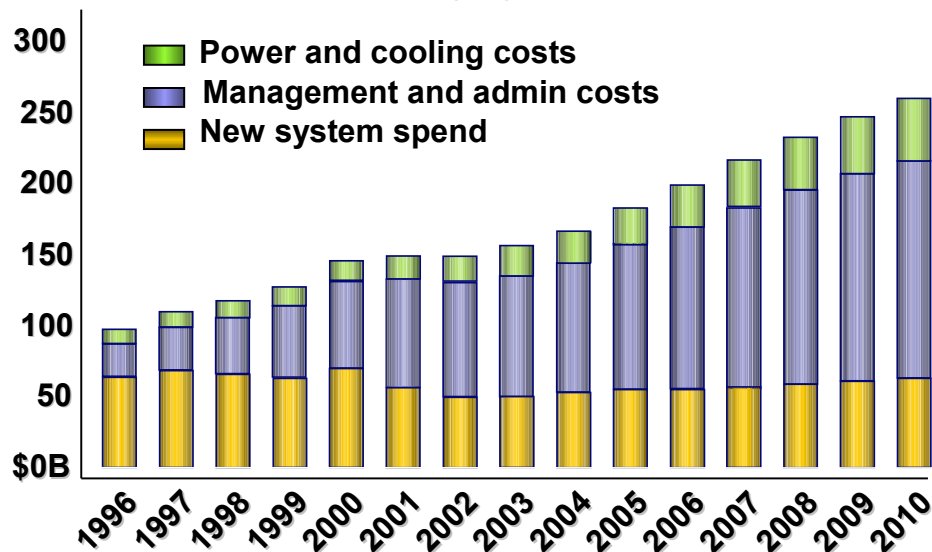
Increasing energy costs from increased compute capacity

Uncontrolled management and operations costs

Steady CAPEX spend

> To make progress, delivery organizations must address the server, storage and network **operating cost** problem, not just CAPEX.
> - Cloud Computing directly addresses all of these.

Source: IBM Corporate Strategy analysis of IDC data

Traditional vs Private Cloud Resource Allocation

Traditional

- Dedicated capacity

- Plan to workload peaks

- Allocate capacity for growth on each server

- Low server utilization rates (<10%)

- Excessive aggregate energy costs

- New build out for every new project

Private Cloud

- Shared resources

- Plan to steady state

- Growth accounted for at the overall resource pool

- High server utilization rates

- Significantly lower energy demands

- On demand resources for new projects

Movement from traditional environments to Cloud
One Step or An Evolution

Many clients are already on the way to cloud with consolidation and virtualization efforts

CLOUD
Dynamic provisioning for workloads

AUTOMATE
Flexible delivery & Self Service

STANDARDIZE
Operational Efficiency

VIRTUALIZE
Increase Utilization

CONSOLIDATE
Physical Infrastructure

Traditional IT

Ready the Infrastructure

Energy/cooling costs

CapEx costs

Operations costs
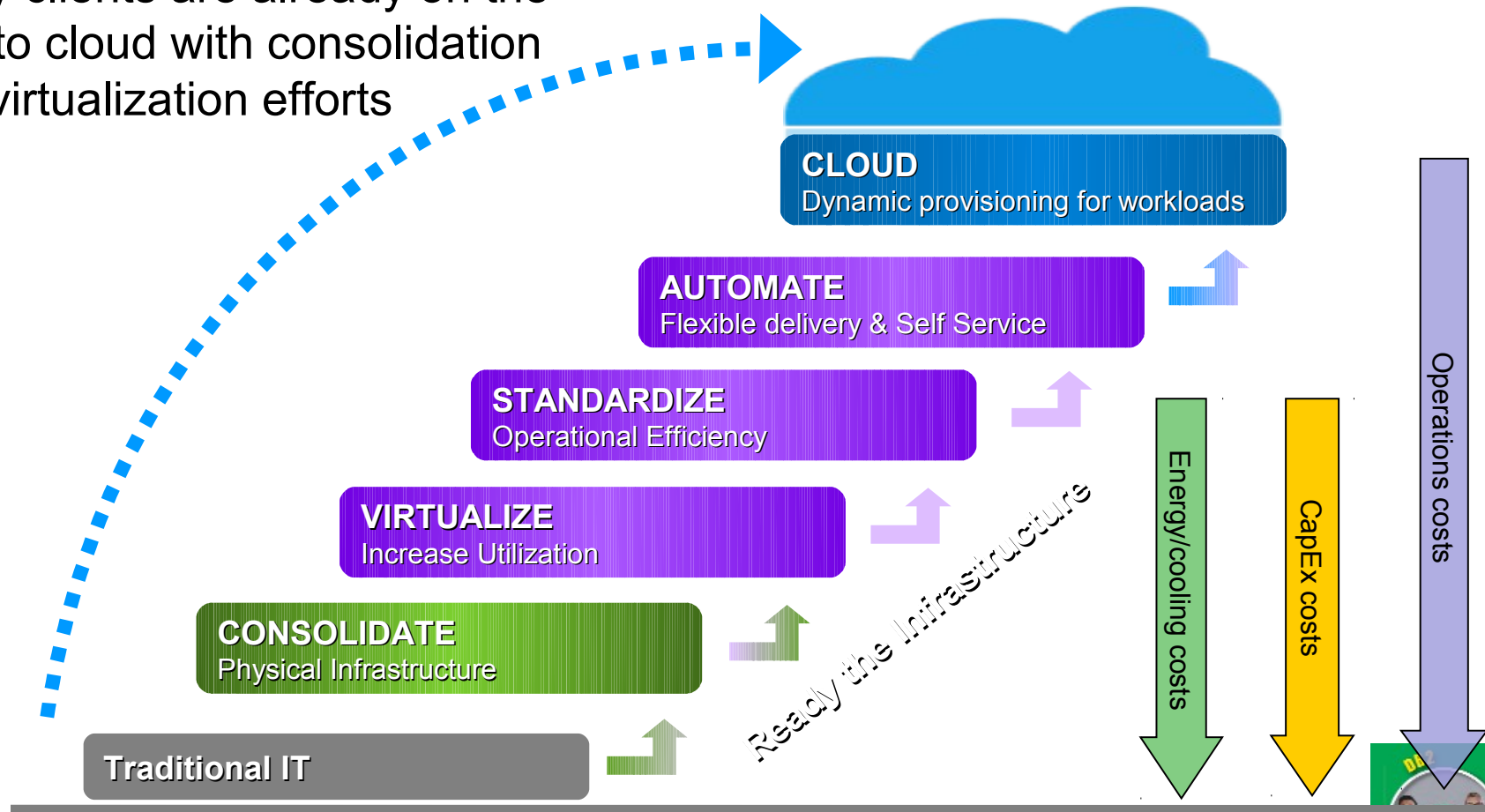
AUTOMATION in the Private Cloud

These processes are executed serially for each new app environment:

Approvals	Procurement	HW Install	OS Install	MW Install	App Install/Config

2-4 month lead time

Factor out repetitive tasks to reduce lead time!

Approvals	Procurement	HW Install

Done once at cloud creation/expansion time

OS Install	MW Install	App Install/Config

Done once at image/pattern creation/customization time

Click "Deploy" and wait

Done for each environment request

Hours or Minutes lead time!

An example of DB2 in a Private Cloud

IBM WORKLOAD DEPLOYER

DB2 in a <u>Private</u> Cloud - In Your Data Center

IBM Workload Deployer

IBM DB2

WAS

WAS

Private Cloud

IBM Workload Deployer Catalog
1. Images
   - DB2 for Linux, UNIX and Windows
   - WebSphere Application Server
   - other IBM middleware
2. Topology Patterns
3. Workload patterns:
   - Pattern for Web Applications
   - Pattern for Database Applications
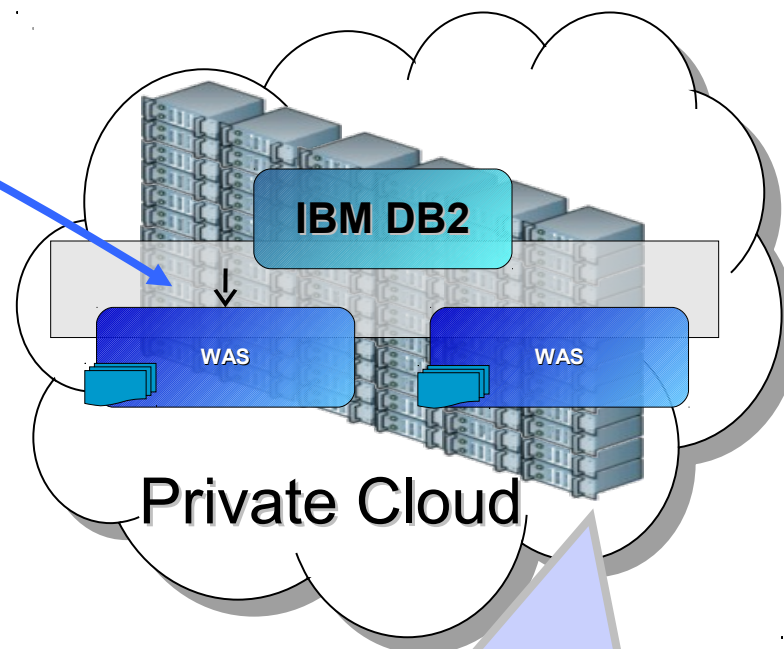
Cloud O/S
- Linux (x86, x64)
- AIX (Power System)
- zLinux (System Z)

Chat with the Lab

STANDARDIZATION: Virtualized Middleware can be deployed as different constructs

Images
(Virtual Machines)

- Basic execution services for standalone VM images
- Complete control over image contents
- Basic image management/library functions
- IBM provided product images
- Ability to create custom images
- Leverages IBM image management tools

Image Management

Topologies
(Virtual Systems)

- IBM defined product images and patterns for common topologies
- Ability to create custom patterns
- Traditional configuration and administration model
- Aligned around existing products
- Automated provisioning of images into patterns

Automated provisioning of middleware

Workloads
(Virtual Applications)

- Application awareness
- Fully integrated software stacks
- IBM defined topologies
- Simplified interaction model
- Highly standardized and automated
- Integrated middleware with cloud capabilities
- Integrated lifecycle management

Integrated middleware with cloud capabilities

IBM Workload Deployer (BYOHW)

Customer Provided Hardware
VMWare/x86, Power/zLinux (topologies)

New and Enhanced DB2 Images and Topology Patterns

| **Latest DB2 Linux images on the appliance** | DB2 Enterprise Server and DB2 Express editions 9.7.3a for SLES 11 64 VM images now pre-loaded on the appliance. Downloadable 9.7.4 images for RHEL |

| **IBM PowerVM Support** | DB2 Enterprise Server Edition 9.7.3a for AIX 6.1 64bit image for IBM PowerVM is pre-loaded on the appliance |

| **HA Clustering Out of the Box** | All new DB2 images have an option to be deployed in a highly available DB2 cluster |

| **Automatic license management** | Deployed DB2 licenses counted automatically based on VM size |

DB2 Images in the IBM Workload Deployer Catalog

- 3 DB2 images in the IBM Workload Deployer catalog
- More available for download
- Don't see the image you want? Request from IMcloud@ca.ibm.com and we may build it for you.
- Create your own custom DB2 images by cloning one of the provided images

- Details :
  - Version
  - Operating system
  - IBM Product ID
  - Parts
  - Where used
- Must accept licenses before use

Anatomy of a DB2 Image

VMWare Tools

DB2 Enterprise v9.7.3a
5765-F41 (PVU license)
SUSE Linux Enterprise Server 11
5724-L43 (Server license)

- Image is a saved copy of a complete server
- Software must be licensed for non-trial use:
  - License proper DB2 edition from IBM
  - OS: purchase SLES from IBM, RHEL from Red Hat
  - Accept VMWare Tools license (free)
- Image maintenance:
  - Create running server
  - Patch/Customize
  - Save your own image

- IWD will track Server (DB2 Express) and PVU (DB2 Enterprise & Workgroup) licenses
- Socket (DB2 Workgroup) licenses managed manually

IBM DB2 Express Edition Server Option	5724-E49	Server	Warn ▾	10 ↕	90.0 % ↕	0	0	0 virtual systems
NOVELL SUSE LINUX ENTERPRISE SERVER FOR X86, AMD64, & INTEL EM64T (MAXIMUM 32 CPU) 1-YEAR SUBSCRIPTION WITH NOVELL STANDARD SUPPORT INCLUDING 12X5 UNLIMITED ELECTRONIC AND TELEPHONE SUPPORT	5724-L43	Server	Ignore ▾	0 ↕	90.0 % ↕	0	0	4 virtual systems
IBM DB2 Enterprise Server Edition	5765-F41	PVU	Warn ▾	1000 ↕	90.0 % ↕	0	0	4 virtual systems

Chat with the Lab

DB2 Topology Patterns in the IWD Catalog

Patterns

Search...

- DB2 Enterprise
- DB2 Enterprise (PowerVM)
- DB2 Enterprise and WAS Highly Available cluster
- DB2 Enterprise and WAS Standalone
- DB2 Express
- DB2 Express and WAS highly available cluster
- Power Server
- Single P...

DB2 Enterprise and WAS Highly Available cluster

Description:	A highly availabe WebSphere Application Server and DB2 pattern
Created on:	May 23, 2011 1:46:54 PM
Current status:	Read-only
Updated on:	May 30, 2011 9:46:08 PM
In the cloud now:	DB2 ESE and WAS HA 2 db2rules
	DB2 ESE and WAS HA 3 db2rules
	DB2 ESE and WAS HA 4 db2rules
Access granted to:	Administrator [owner]
	Everyone [read] [remove]
	Add more...

Topology for this pattern:

Deploys to ESX hypervisors.

- **Deployment manager** 7.0.0.17
  - Cluster configuration
  - Create DB2 Data Source to a highly available DB2 Enterprise database cluster

- **2** **Custom nodes** 7.0.0.17
  - JVM tuning
  - Install DB2 drivers

- **1** **IBM HTTP servers** 7.0.0.17

- **DB2 Enterprise HADR Standby** 9.7.3.1

- **DB2 Enterprise HADR Primary** 9.7.3.1

Details :
- Where used
- Authorizations

Graphical representation of all topology details:
- Systems
- Configuration options
- Config. Scripts

- Several patterns containing DB2 preloaded on IWD
- Create your own patterns by cloning and editing
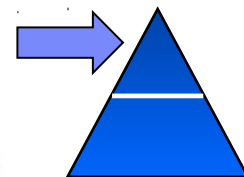- Need help? Email IMcloud@ca.ibm.com and we will help you create a pattern you need.

...poration

DB2 Chat with the Lab

IBM Workload Deployer

Download command line tool

Setting up your private cloud

Step 1: Set up the appliance

Customize the appliance settings and create user accounts. You can also create user groups.

Customize settings | Create users

Step 2: Set up the cloud

Create the cloud by identifying IP groups and collections of hypervisors called cloud groups.

Add IP groups | Add cloud groups

Step 3: Add virtual images

Provide new virtual images to the catalog by uploading files or extending pre-built images.

Add virtual images | Add script packages

Step 4: Set up pattern types

Install and configure the pattern types to enable the creation of virtual application patterns.

Add pattern types | Settings for Platform Service

Working with virtual applications

Working with virtual systems

Working with virtual appliances

Workload Patterns
(Virtual Application patterns)

IBM Workload Deployer Pattern for Web Applications

IBM Workload Deployer

Caching component

Elastic App Server

Requires

DB2 Connect

Private Cloud

Catalog of Workload Patterns
- Pattern for Web Applications
- Pattern for DB2 Workgroup Server Edition
- future workload patterns

DB2 for LUW

DB2 for z/OS
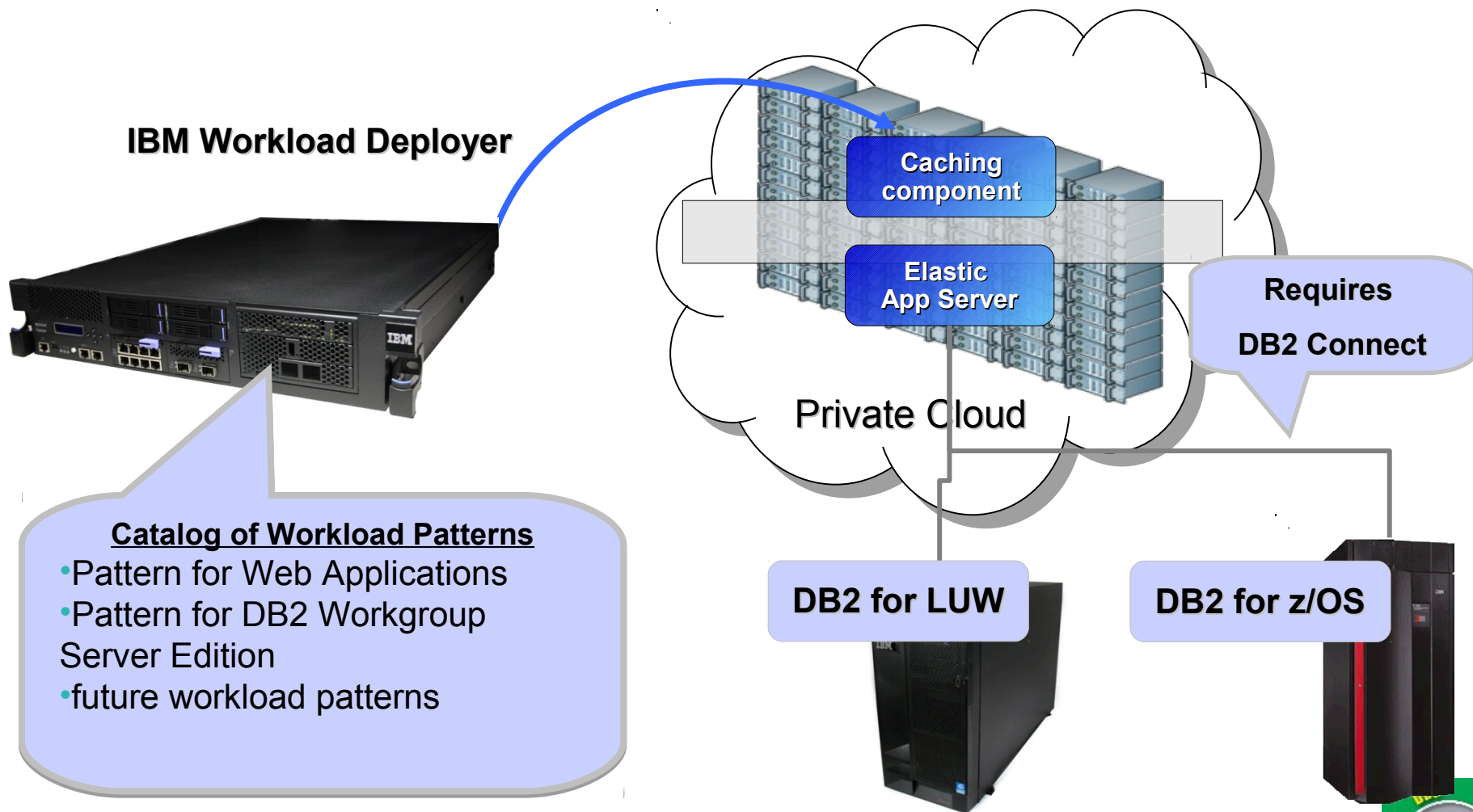
DBaaS: Roles

- **Application Group: Empower the application group (business enablement)**

- **Operations Group: Reduce data center costs (standardization, automation, etc)**

Goal: Empower the Application Group

Goal: Reduce operational costs by 50%

DBaaS from IBM

IBM DB2.

Application
(via REST)

Application
Developer

Application
Admin

10, 100s or 1,000s of DBs

Application Group
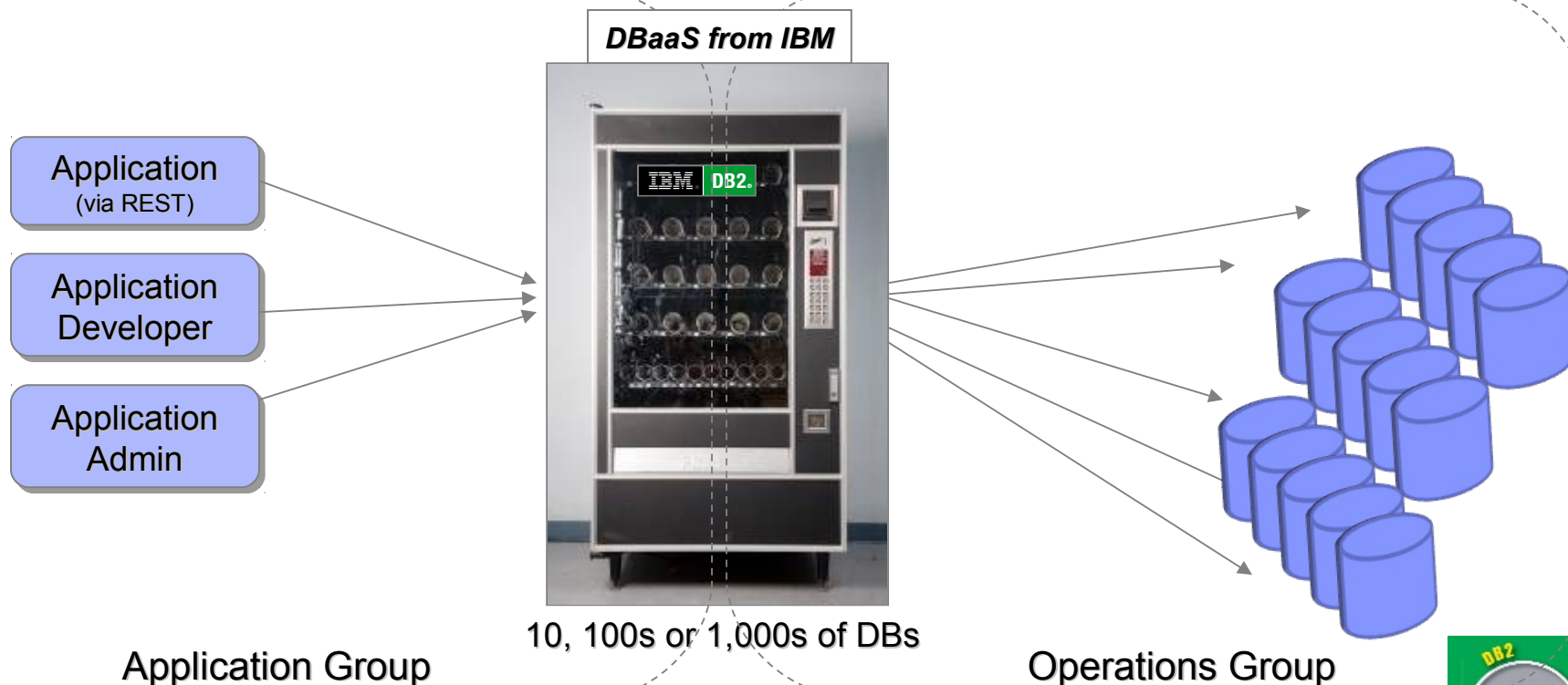
Operations Group

Note: Underlying system is hidden from Applications Group

New Workload Pattern:
IBM Workload Deployer Pattern for DB2 Workgroup Server Edition
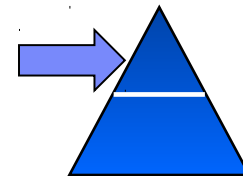
Self service deployment and management

Includes database-as-a-service management capabilities with DB2 Workgroup Server Edition for RHEL 5.6 for VMWare ESX deployment

- Automated configuration for Development/Test and departmental use cases

- Self-service management capabilities like database provisioning and backups – through GUI on the appliance, and REST APIs

- Ability to auto-configure for Oracle compatibility

- Ability to wire the database with other components in a web app/cloud application for automated configuration

- Appliance includes clients for Optim Development Studio and Optim Database Administrator

Example: Database Workload Pattern

Example: Web App Workload Pattern
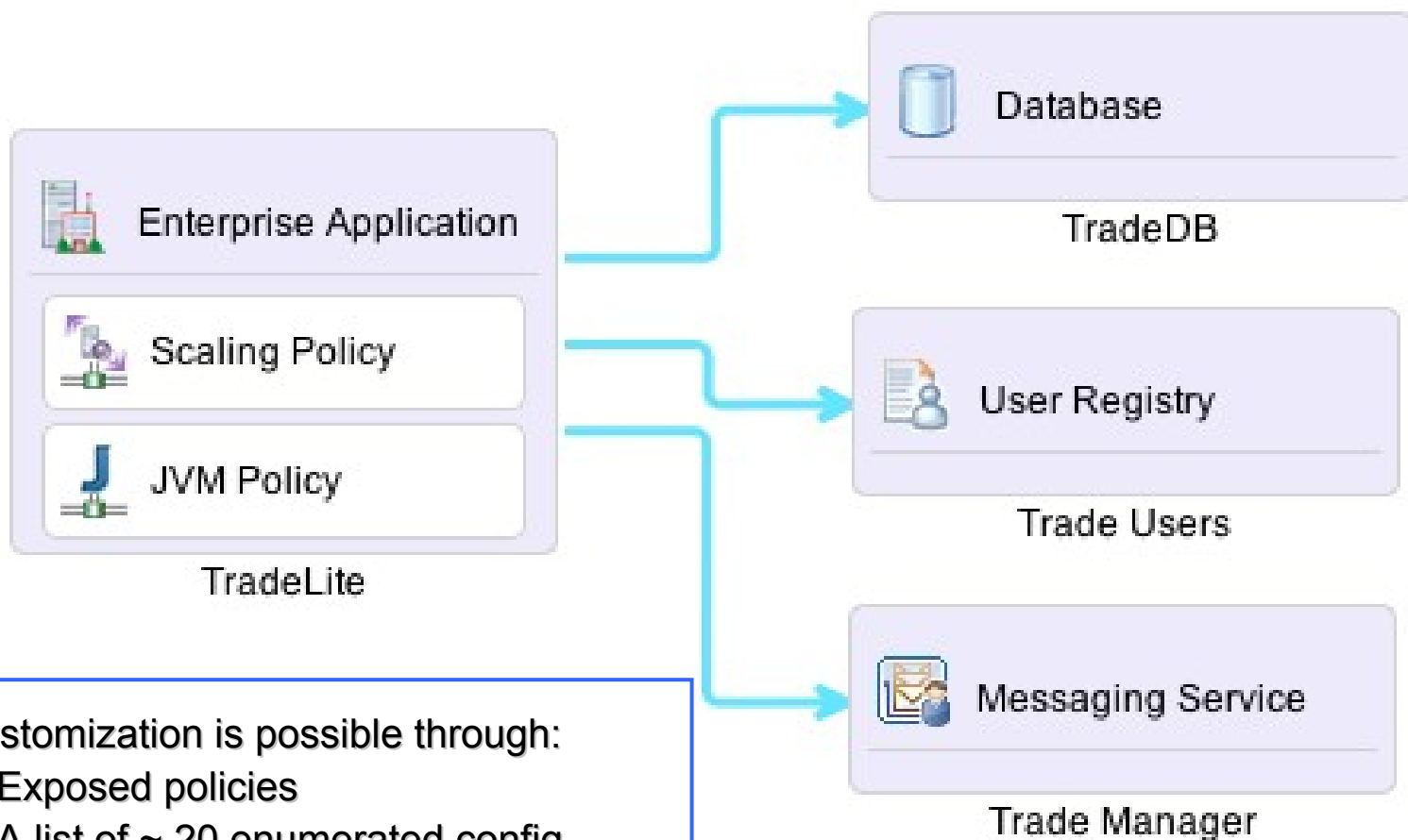
Customization is possible through:
- Exposed policies
- A list of ~ 20 enumerated config options per part
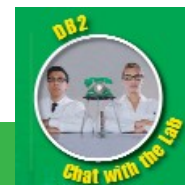
Cloud Application Builder
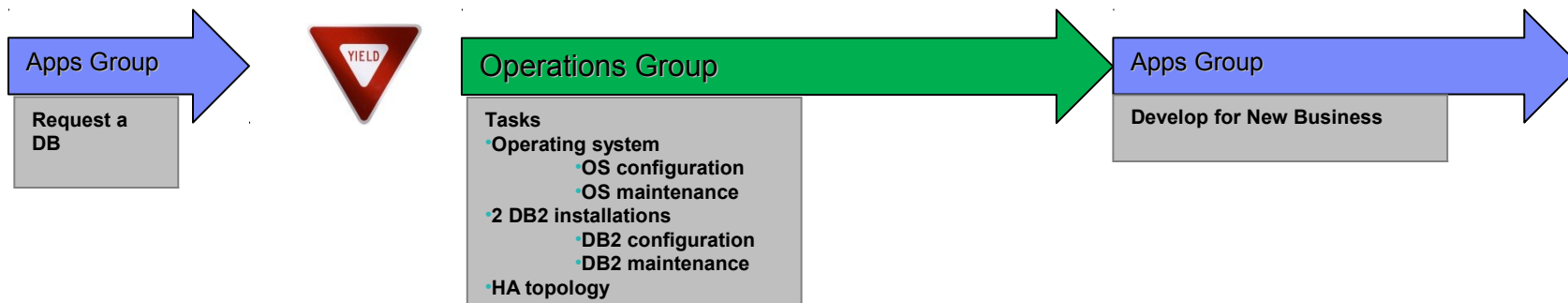
DBaaS: Oracle or DB2 Applications

- **A DBaaS that supports DB2 applications and Oracle applications**
  - DB2's native Oracle compatibility is being surfaced to the DBaaS front end

- **Application groups can continue to use their "Oracle application"**

- **Single-skill set for Operations Group**

Oracle Application

DB2 Application

DB2 with Native Oracle Capability

DB2

Provisioning for your Business!

- **Traditional Deployment**

Apps Group		YIELD	Operations Group		Apps Group

Apps Group

Request a
DB

Operations Group

Tasks
•Operating system
•OS configuration
•OS maintenance
•2 DB2 installations
•DB2 configuration
•DB2 maintenance
•HA topology

Apps Group

Develop for New Business

- **DBaaS Deployment**

    1) Pattern does not exist

Apps Group

Check for
existing DB
Pattern

Operations Group

• Create Pattern
• Deploy it

Apps Group

Develop for New Business
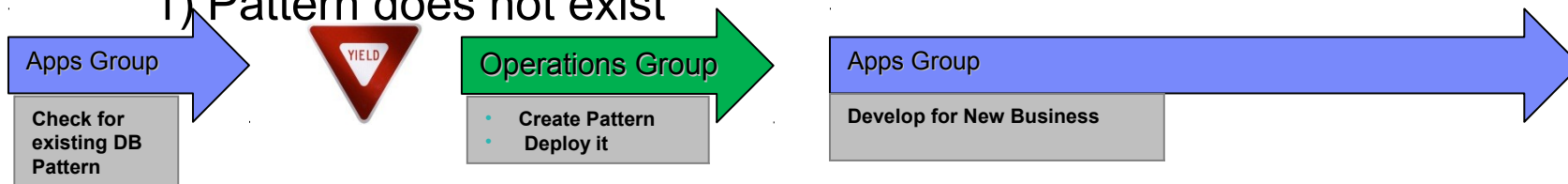
    2) Pattern already exists (or App Group creates Pattern)

Apps Group

Deploy DB Pattern
Develop for New Business
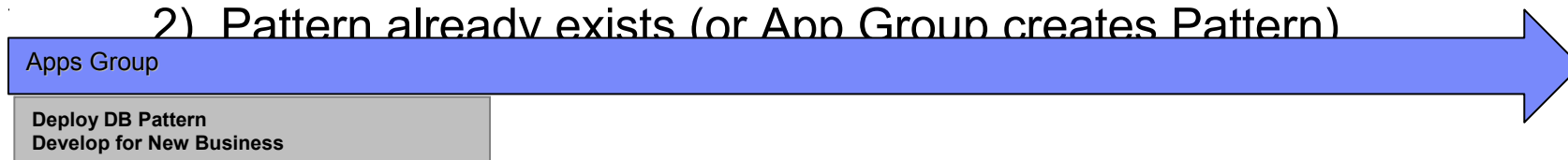
TIME FOR A DEMO

Benefits to an IT Organization

- **Business Value x 2**

  - **Application Group:** Empower the application group (business enablement)

  - **Systems Group:** Reduce data center costs (standardization, automation, etc.)

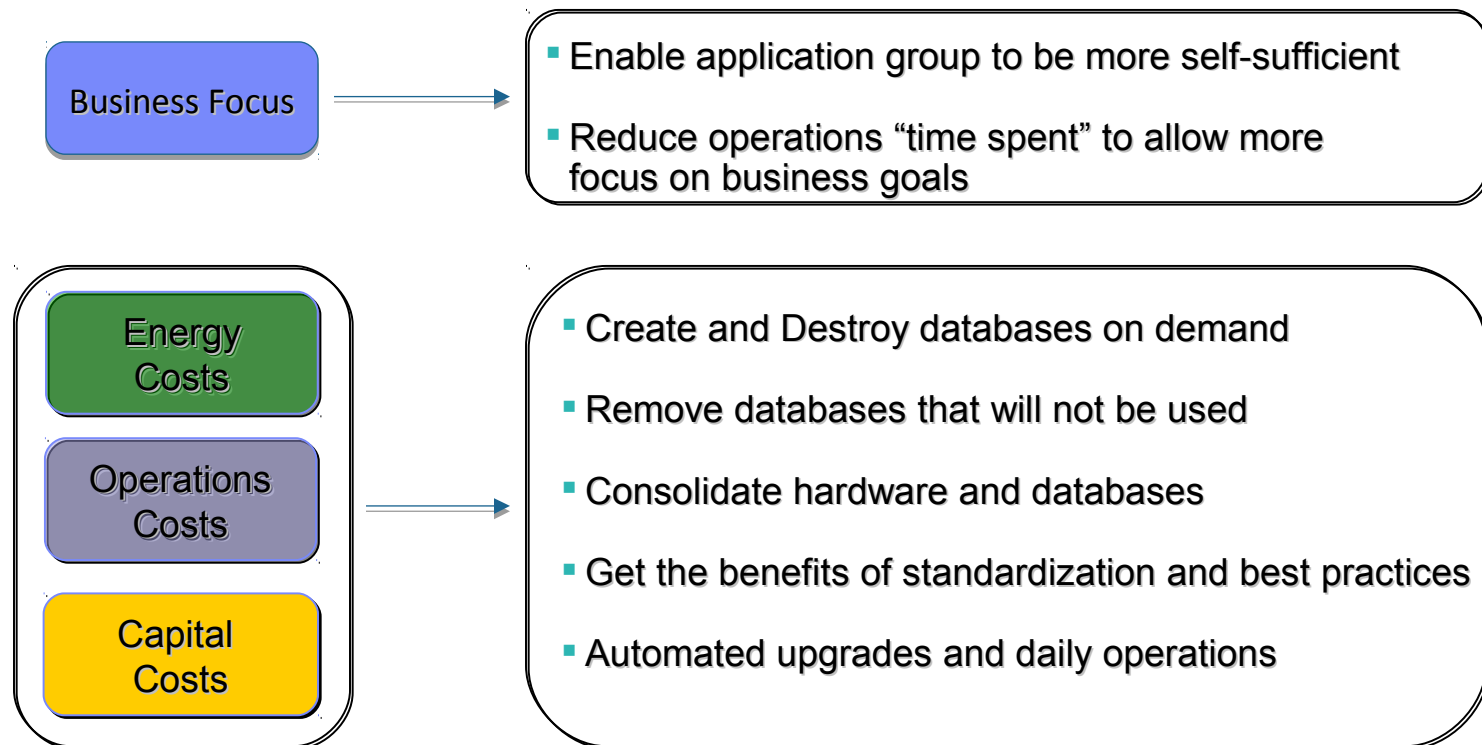| Business Focus | ▸ Enable application group to be more self-sufficient

▸ Reduce operations "time spent" to allow more focus on business goals |

| Energy Costs

Operations Costs

Capital Costs | ▸ Create and Destroy databases on demand

▸ Remove databases that will not be used

▸ Consolidate hardware and databases

▸ Get the benefits of standardization and best practices

▸ Automated upgrades and daily operations |

What Our Customers Are Saying!

"Our test/dev databases are never cleaned up"

"DB2 Farm"
- Telecom in US, Public Sector in Canada

"We need to reduce energy costs"

""DB2 On Demand" – Health Insurance"

"It takes 2-6 weeks to get a new database"

"DB2 Hotel"
- Services Provider in Europe

"**We want our technical people thinking about our business**"

DB2
Chat with the Lab

Why DB2 on IBM Workload Deployer

- **Deliver** best practices for repeated, consistent, and secure deployment

- **Automate** database deployments with centralized security, deployment, and logging features

- **Empower** the application group within IT to provision databases with minimal effort

Energy Costs

Capital Costs

Operations Costs
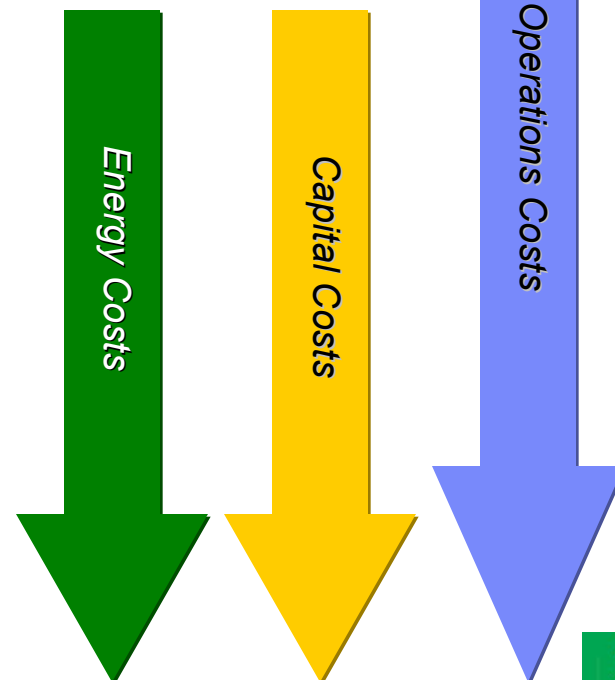
Resources

- **Contact:**
  - IMcloud@ca.ibm.com

- **DB2 for IBM Workload Deployer**
  - http://ibm.co/jazUMW

- **DB2 options for Cloud Computing:**
  - www.ibm.com/db2/cloud

- **IBM Workload Deployer**
  - http://ibm.co/iaKOlR

> Questions

Thank You!

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Thank you for attending!