LSU October 2007

zIIP experience at Volvo IT

mats.brunnstedt@se.ibm.com
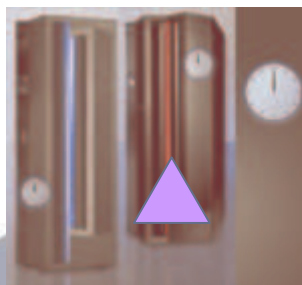
Agenda

- What is zIIP + The latest news
- Volvo IT user experiance
- Questions
- Summary

Specialty Engines
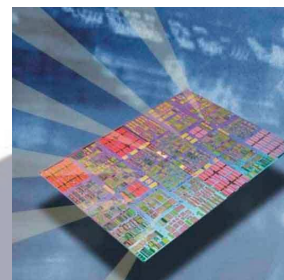
z9 Integrated Information Processor 2006

zAAP 2004

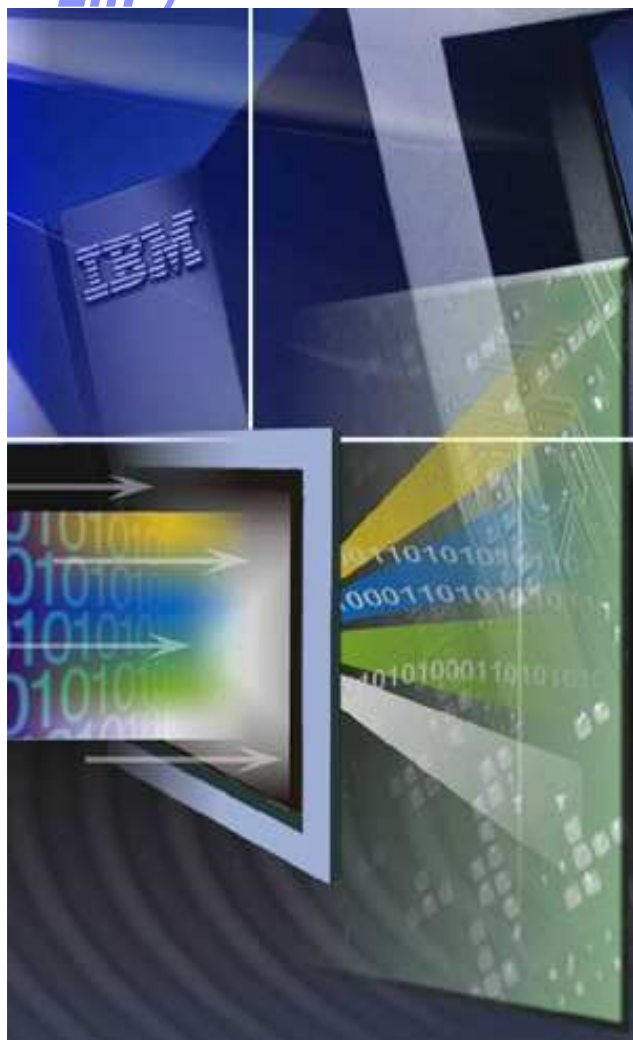**IFL 2000**

ICF 1997

Eligible for zAAP:
- Java™ execution environment
- z/OS XML System Services

Eligible for zIIP:
- DB2 remote access and BI/DW
- ISVs
- IPSec encryption
- z/OS XML (SOD)

ON DEMAND BUSINESS™

Helping customers integrate data across the enterprise
## *The new IBM System z9 Integrated Information Processor (IBM zIIP)*

- z/OS and z/OS.e manages and directs work between the general purpose processor and the zIIP
  - No changes anticipated to DB2 Universal Database™ (UDB) for z/OS V8 applications
  - Number of zIIPs per System z9 not to exceed number of general purpose processors
  - Price for each zIIP 1/4 - 1/3 of the price of a GP
  - **No IBM software charges on the zIIP – consistent with other specialty engines**
- DB2 UDB for z/OS V8 will be **first** IBM exploiter of the zIIP with:
  - System z9 EC and z9 BC
  - z/OS and z/OS.e 1.6 or later
  - DB2 UDB for z/OS V8
- Portions of the following DB2 UDB for z/OS V8 workloads may benefit from zIIP*:
  - ERP, CRM, Business Intelligence and other enterprise applications – via DRDA® over a TCP/IP connection
  - Data warehousing applications* – requests that utilize long running parallel queries
  - DB2 UDB for z/OS V8 utilities* – select internal DB2® utility functions used to maintain index maintenance structures

* The zIIP is designed so that a program can work with z/OS to have all or a portion of its enclave Service Request Block (SRB) work directed to the zIIP. The above types of DB2 V8 work are those executing in enclave SRBs, of which portions can be sent to the zIIP.
NOTE: z/OS.e is supported only on z9 BC

ON DEMAND BUSINESS™

DB2 V8 exploitation of IBM zIIP can add value to database workloads

- **Portions of the following DB2 for z/OS V8 workloads may benefit from zIIP***
  1. ERP, CRM, Business Intelligence or other enterprise applications
     - Via DRDA® over a TCP/IP connection

New Specialty Engine
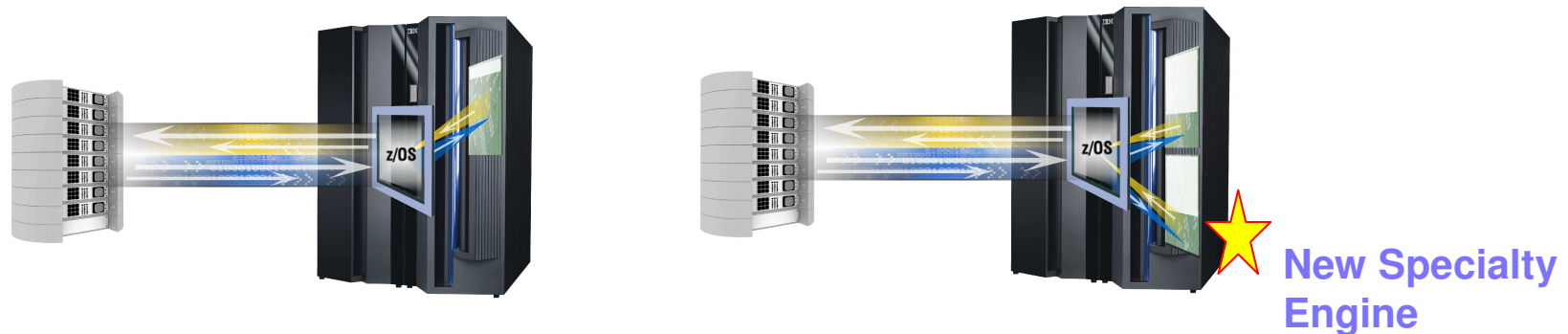
  2. Data warehousing applications*
     - Requests that utilize star schema parallel queries

  3. DB2 for z/OS V8 utilities*
     - Internal DB2 utility functions used to maintain index maintenance structures

* The zIIP is designed so that a program can work with z/OS to have all or a portion of its enclave Service Request Block (SRB) work directed to the zIIP. The above types of DB2 V8 work are those executing in enclave SRBs, of which portions can be sent to the zIIP.

ON DEMAND BUSINESS™

New! - zIIP Assisted IPSec
Available August, 2007

- **z/OS Communications Server allows IPSec processing to take advantage of zIIPs**
    - This zIIP Assisted IPSec function moves most of the z/OS IPSec processing from the general purpose processors to the zIIPs.
        - In addition to performing the encryption processing, the zIIP can also handle cryptographic validation of message integrity, and IPSec header processing.
        - Specifically, the z/OS Communication Server (z/OS CS) is designed to interact with z/OS Workload Manager to have all of its IPSec enclave Service Request Block (SRB) work made eligible to run on the zIIP.
    - In addition, zIIP Assisted IPSec may provide a performance improvement for IPSec processing
        - Especially when processing on general purpose processors have been CP-constrained

What is IPSec?

- **What is IPSec?**
  - IPSec (IP security) is a suite of protocols for securing Internet Protocol (IP) communications by authenticating and/or encrypting each IP packet in a data stream. IPSec also includes protocols for cryptographic key establishment.
  - IPSec helps enable secure tunnels between two IP entities –Virtual Private Network.
  - Helps provide end-to-end network encryption

- **Why is it important?**
  - Some encryption technologies are application-specific (applied in appl. or IP layer)
    - SSL, Open SSH, AT-TLS encrypt applications with sensitive data

Applications (IP packets) with sensitive data are encrypted

  - IPSec is designed to encrypt specific applications
  - **OR** IPSec can encrypt all traffic over an IP connection :
    - Server, client, printer, disk, remote data center, to branch office... to any IP node that is IPSec compliant
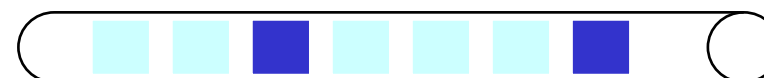
Applications with sensitive data are encrypted

All traffic over the IP connection is encrypted

August 2007 announcement - z/OS XML System Services*

Announcement:
1. **NEW! z/OS XML System Services is enabled to take advantage of zAAPs.**

   Statement of Direction, at a future date:
2. **IBM is intends to enable the z/OS XML to take additional advantage of zIIPs.**
   (i.e. 100% zIIP redirect, greater than the current (about half) for DRDA)
3. **IBM also intends to extend and expand the use of z/OS XML System Services with additional future enhancements:**
   - IBM intends to enhance the XML Toolkit for z/OS so eligible workloads use z/OS XML. This allows eligible XML Toolkit processing to exploit zAAP.
   - IBM intends to add validating parsing to the z/OS XML component. This extends zAAP and zIIP exploitation to include XML validating parsing workload as well.

System z9

ON DEMAND BUSINESS™

XML – a powerful but costly language

DATA PASSED: IBM 94

5 chars
Traditional

- **Example: look up IBM stock price**

```
SAMPLE CODE:
<SOAP-ENV:Envelope
xmlns:SOAP-ENV=
    "http://www.w3.org/2001/06/soap-envelope"
SOAP-ENV:encodingStyle=
    "http://www.w3.org/2001/06/soap-encoding">
<SOAP-ENV:Body>
```

272 chars
with XML
and SOAP

```
<Signature Id="MyFirstSignature" xmlns="http://www.w3.org/2000/09/xmldsig#">
  <SignedInfo>
    <CanonicalizationMethod Algorithm="http://www.w3.org/TR/2000/CR-xml-c14n-20001026"/>
    <SignatureMethod Algorithm="http://www.w3.org/2000/09/xmldsig#dsa-sha1"/>
    <Reference URI="http://www.w3.org/TR/2000/REC-xhtml1-20000126/">
      <Transforms>
        <Transform Algorithm="http://www.w3.org/TR/2000/CR-xml-c14n-20001026"/>
      </Transforms>
      <DigestMethod Algorithm="http://www.w3.org/2000/09/xmldsig#sha1"/>
      <DigestValue>YWJjZGxma3NqamRlZmZnaGlvcztkbGZramFzZGw7Cg==</DigestValue>
    </Reference>
  </SignedInfo>
  <SignatureValue>
    YWJjZGxma3NqamZmZnaGlvcztkbGZramFzZGw7Cg==
  </SignatureValue>
  <KeyInfo>
    <KeyValue>
      <DSAKeyValue>
        <P>...</P><Q>...</Q><G>...</G><Y>...</Y>
      </DSAKeyValue>
    </KeyValue>
  </KeyInfo>
</Signature>
```

Over 919 chars to add digital signature only

And many more chars to add encryption

9

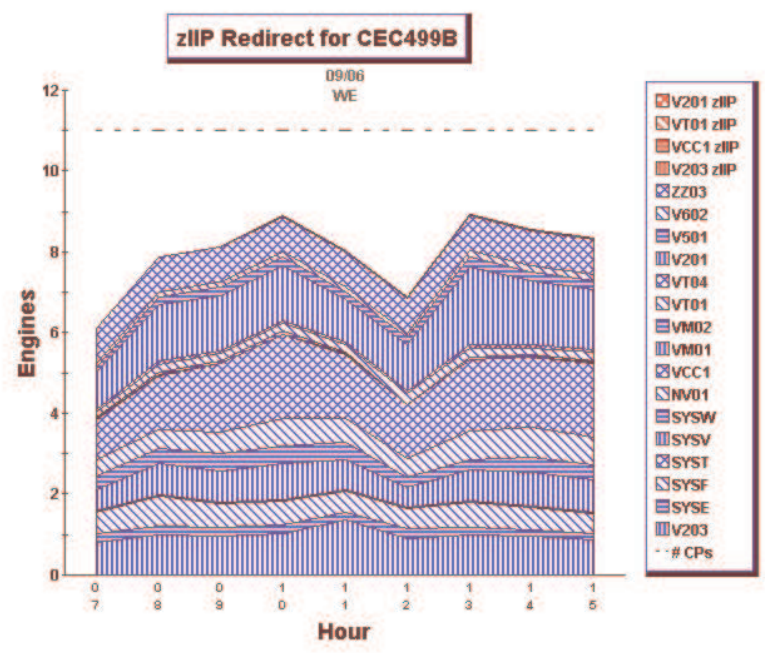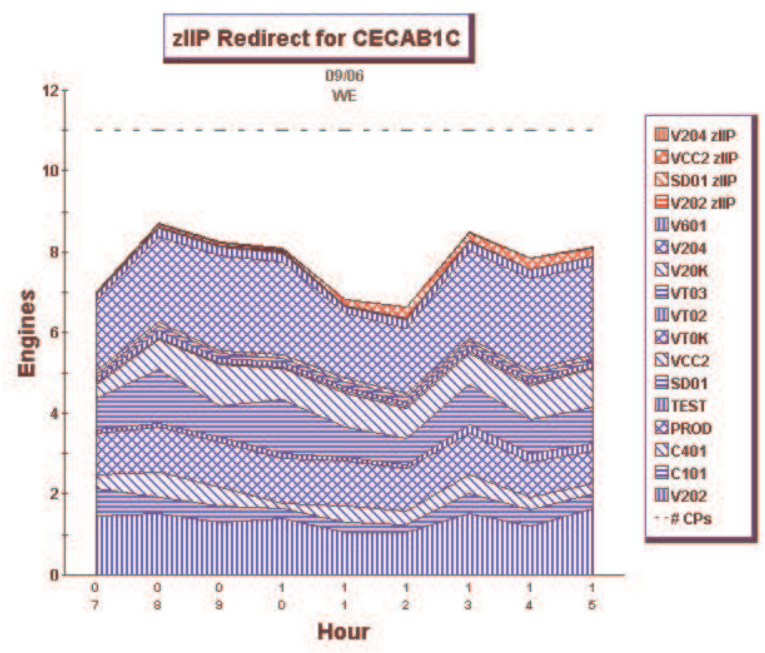zIIP user experience at Volvo IT

Volvo IT configuration 2006

Lyon VM Linux VT Other External Customers		A-town G-boro Gent VT Other	

CF

Test plex
5 LPARs

V2/VCC/
SD

V2/VCC/
SD

CF

"Price plex"
> 50% of
the load,
14 active
LPARs

SAP
Customer

SAP
Customer

External
Customers

External
Customers
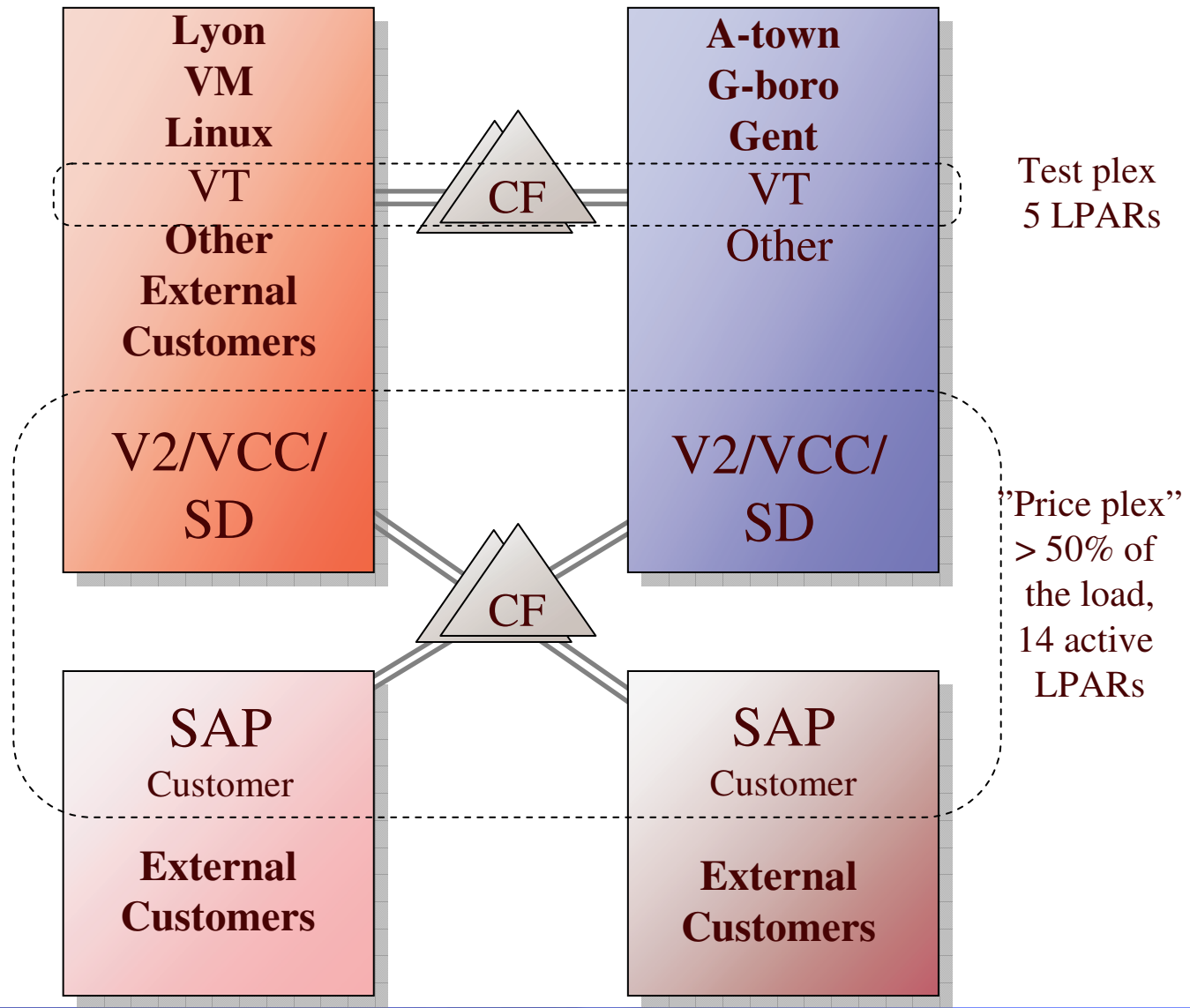
Two proposals

- **4 CEC solution**
  - Easy to migrate
  - Only zIIP in two out of four CECs

- **2 CEC solution**
  - Better utilization of installed resources
  - Cheaper software
  - zIIP accessible from all LPARs

Volvo IT "concern"

- "New workload" such as SAP has a demand of processor power which is harder to predict, compared to IMS, CICS and batch applications.
- SAP will grow the coming years.

SAP Application Server and SAP Database Server

AIX®

SAP Appl Server

DB2 Connect™

TCP/IP

System z

SAP DB Server

z/OS

z/OS

DB2 V8
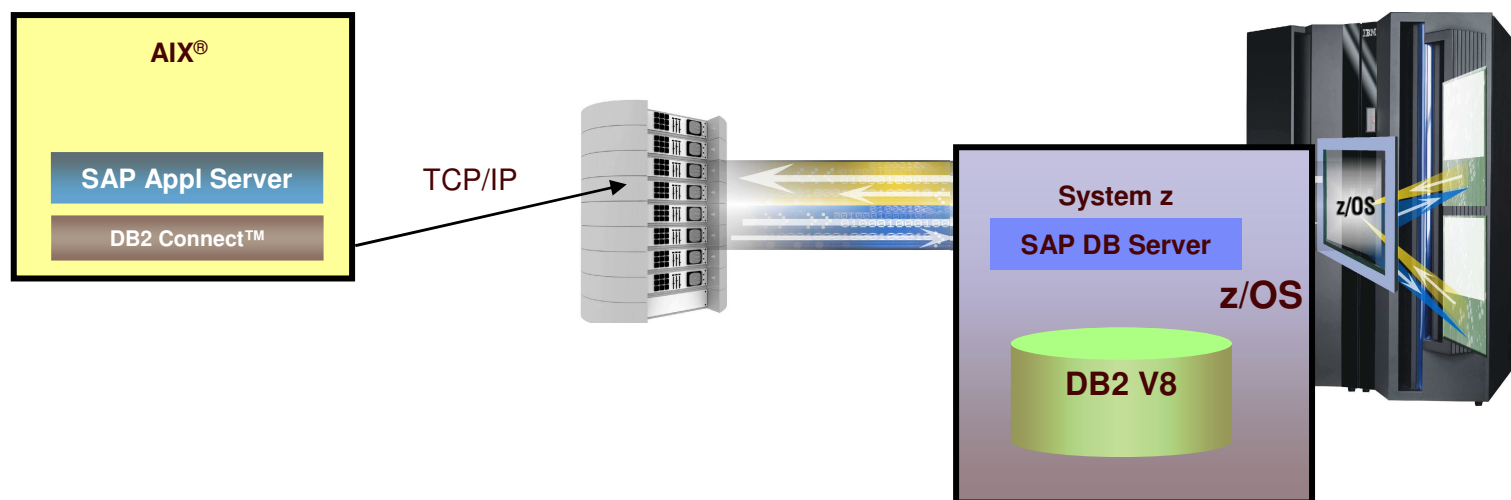
Requirements for SAP DB to take advantage of zIIP

- HW - System z9 EC and z9 BC
- z/OS and z/OS.e 1.6 or later
- DB2 UDB for z/OS V8 or later
- SAP on release using DB2 Connect to access DB2 (not ICLI)

zIIP estimation

Two methods

1. **zCP3000** with IBM. SMF records 70-72

2. **PROJECTCPU** very accurate and very simple.

First zIIP analyze with zCP3000 at VIT
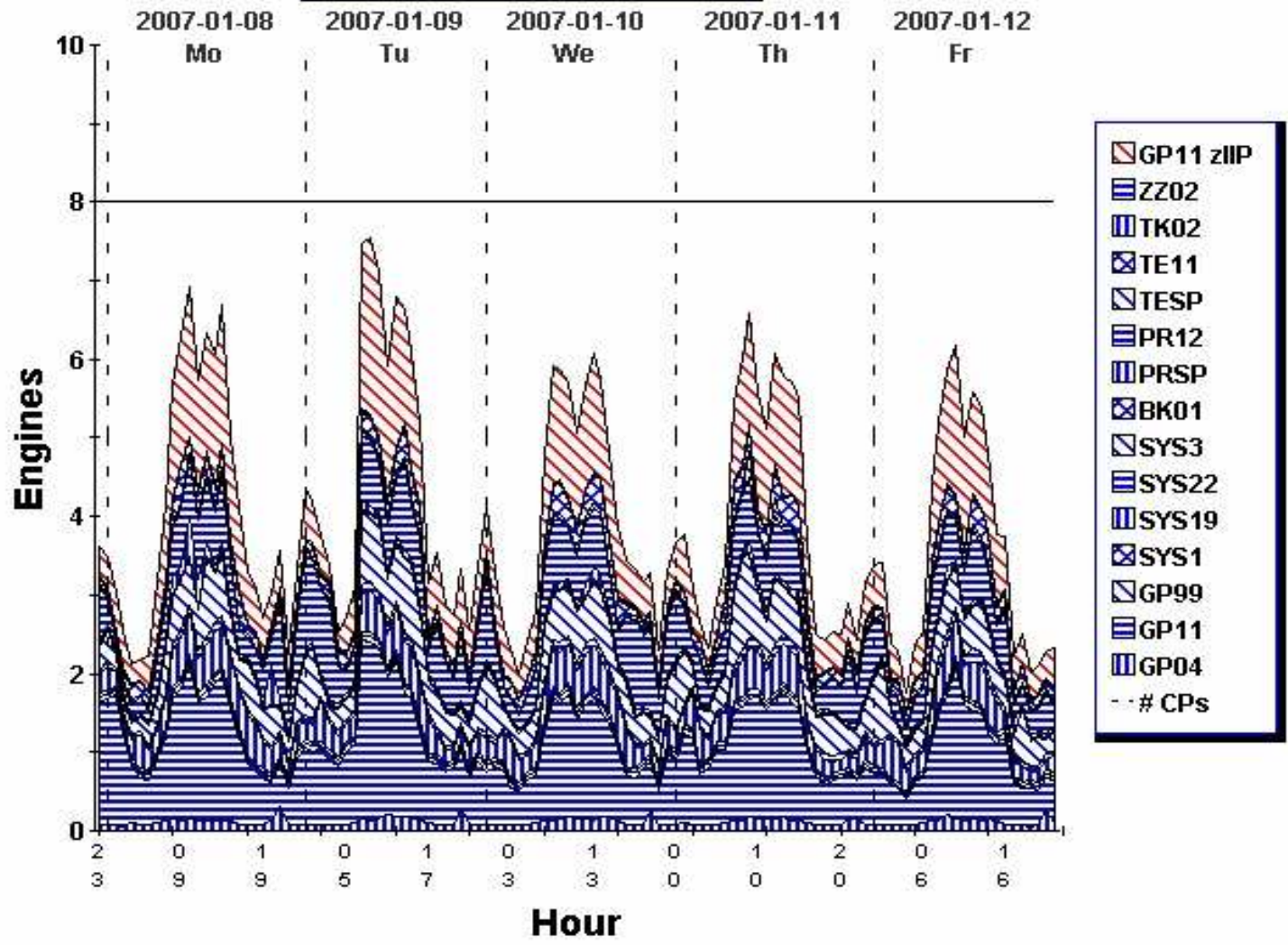
Estimation without running on needed software level

Outcome

Volvo IT configuration 2007

Lyon Gent VM VT Linux		A-town G-boro VT Linux

Test plex 5 LPARs

Other External Customers — CF — **Other External Customers**

V2/VCC/ SD SAP Customer	CF	V2/VCC/ SD SAP Customer

Price plex > 50% of the load, 13 active LPARs

2 * z9 EC
2094-S38
> 17000 MIPS
max 27400 MIPS
in 76 processors

In each:
128 GB Memory
1 zAAP, 1 IFL
2 zIIPs
18 resp. 16 GPs

LPARs:
54 active
40 inactive
94 in total
+ 40 zLinux
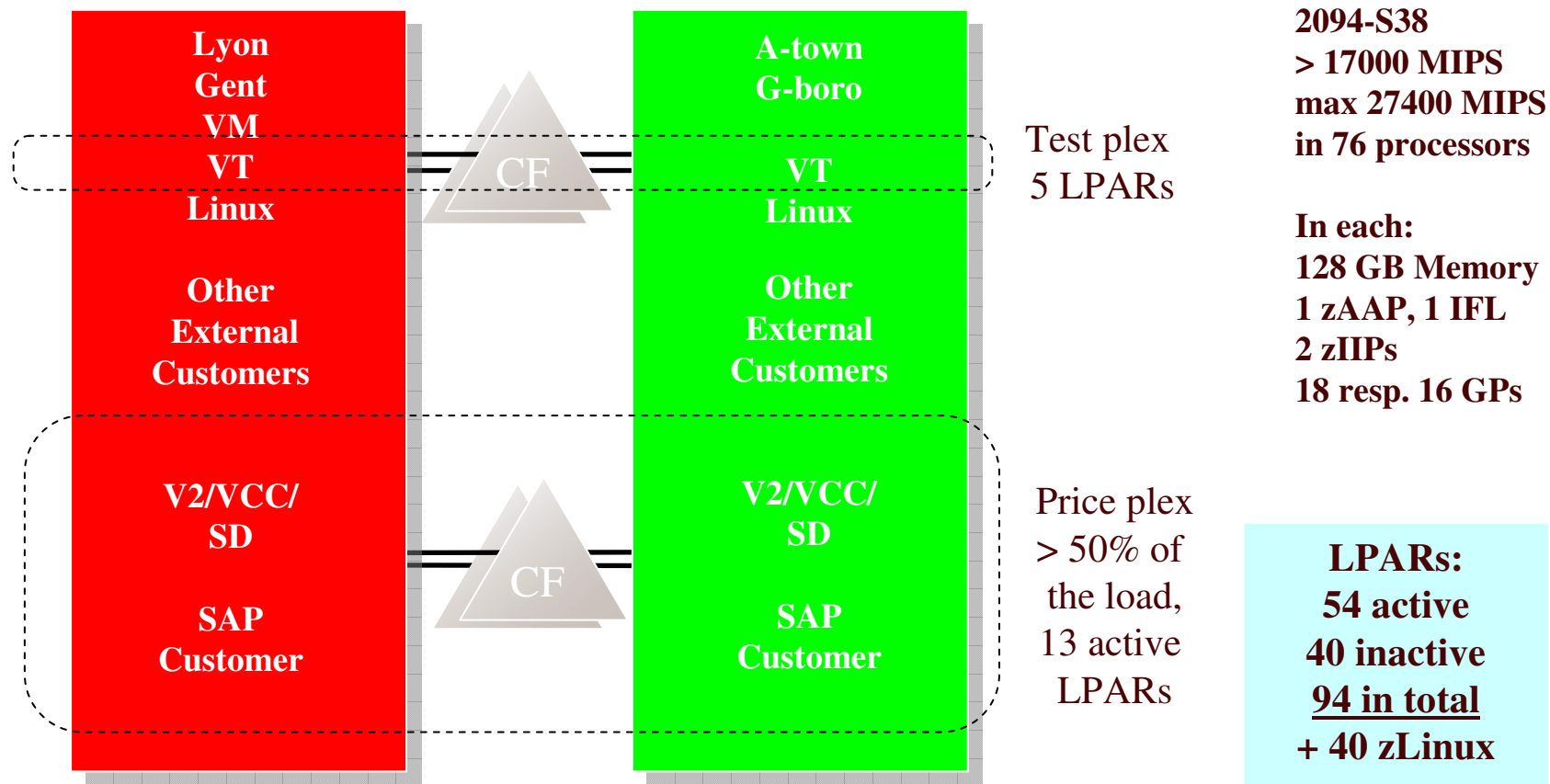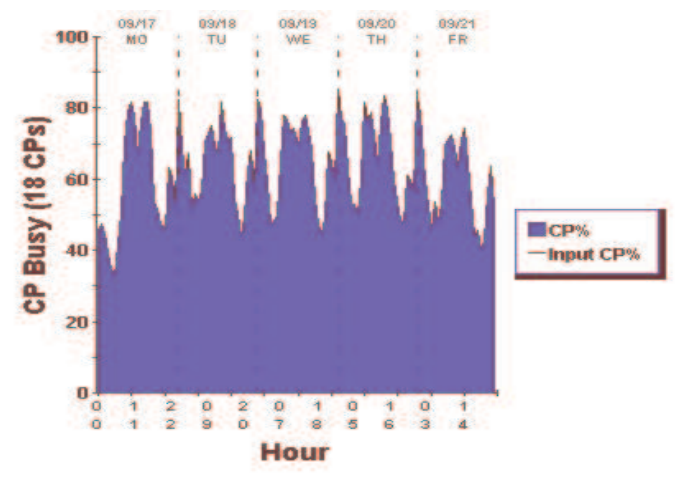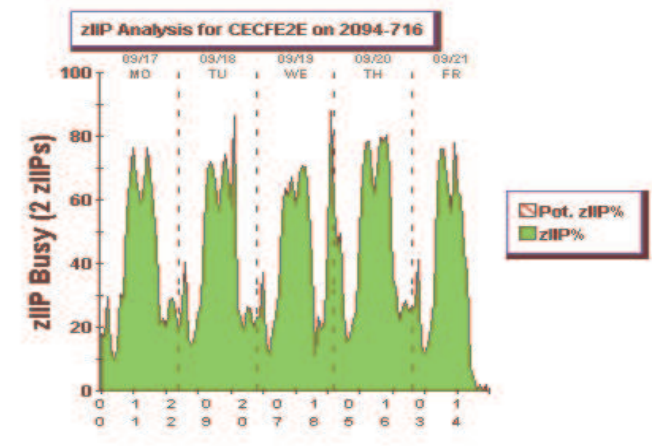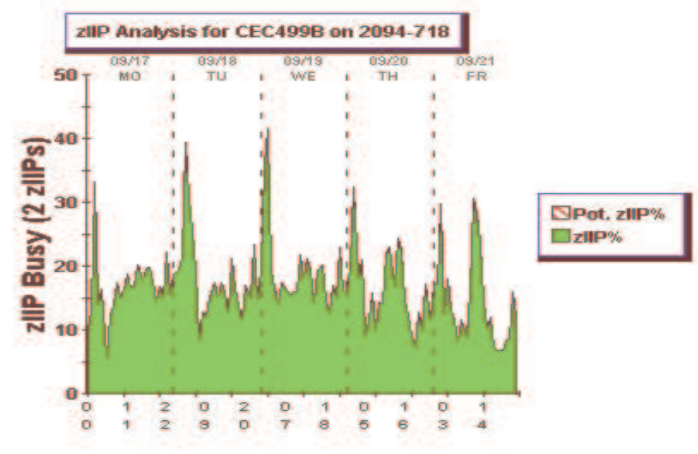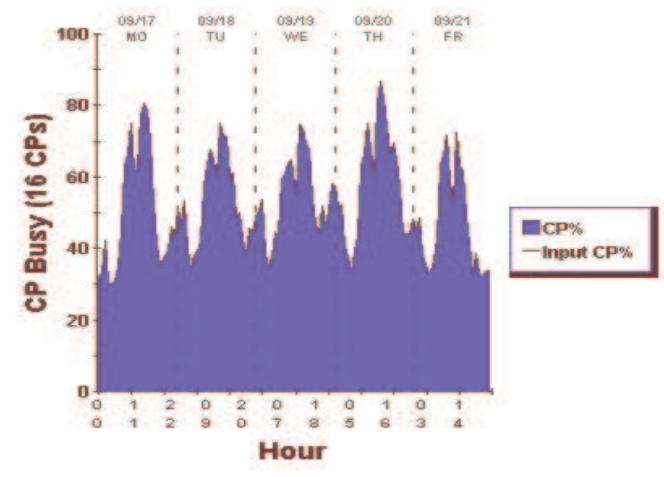
RED   GREEN

Offload % to zIIP

RED

GREEN

offlad % all lpars in RED

offload % all lpars in GREEN

offload % GP19+GP12+GP03 in RED
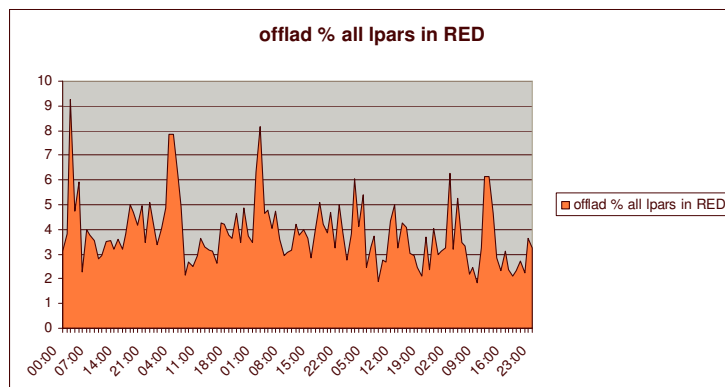
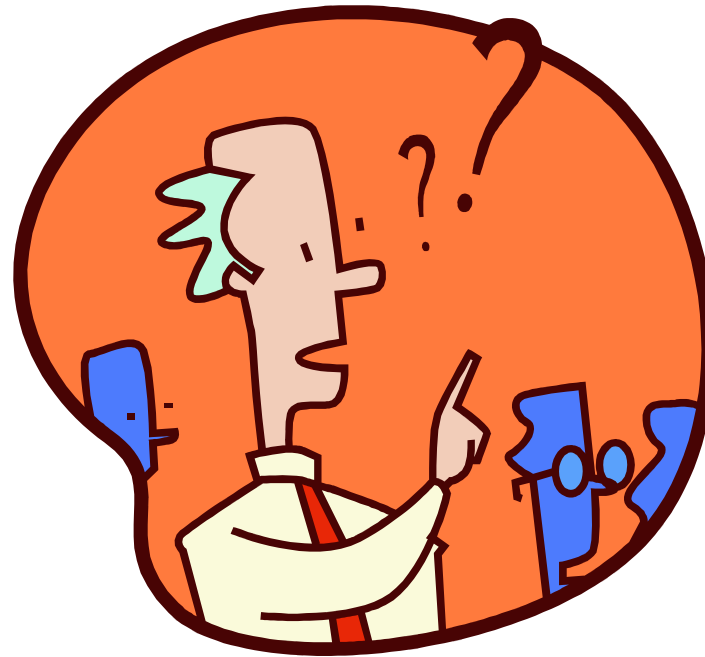offload % GP11 in GREEN

Why poor offload % in RED?
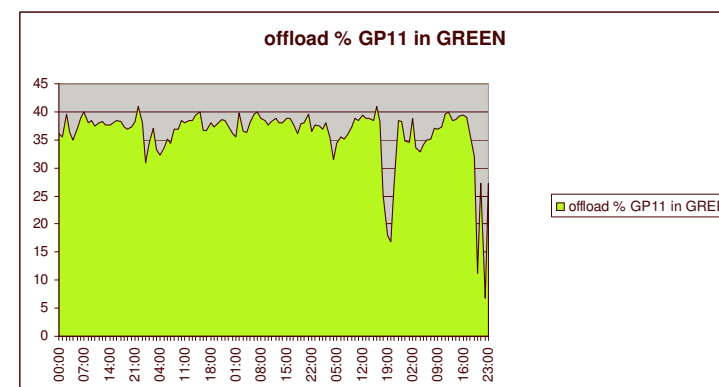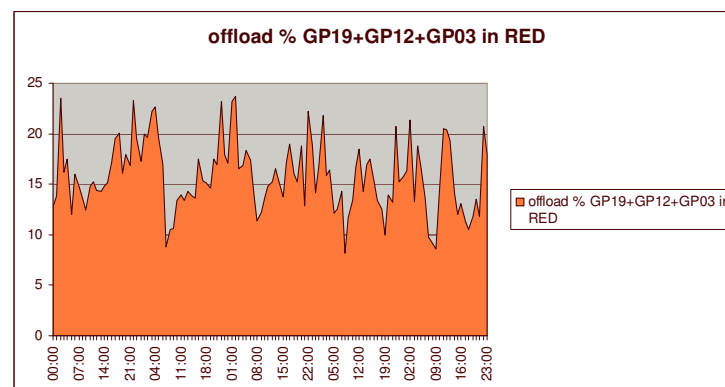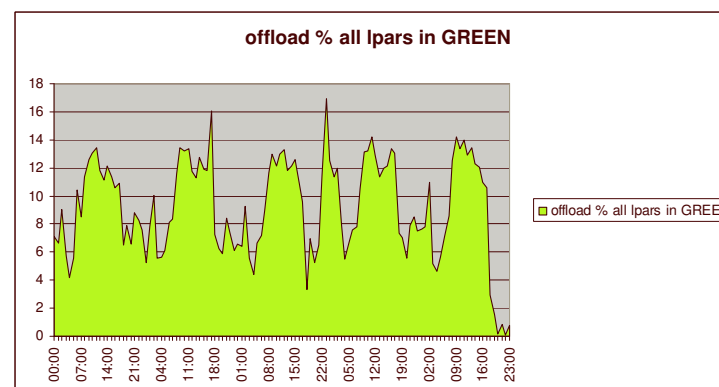
offload % GP19+GP12+GP03 in RED
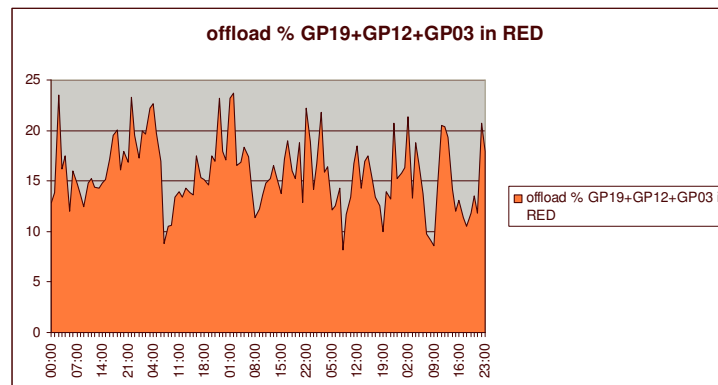
- GP19 - The largest DB server not yet on required SW to use zIIP
- GP12 – A number of small test/dev DB servers
- GP03 is a small system

Questions

Sumup zIIP user experience

- System z must change to meet new demands

- zIIP - It works as expected

- Necessary to work together

Backups

Svenska Handelsbanken looks to zIIP up security

"zIIP Assisted IPSec provides us with the security our clients demand at an attractive cost to the business"
BUSINESS REQUIREMENT:

"Protecting our critical business data and applications is paramount to our business and our clients, so securing our communications from our core mainframe applications to our international offices is a critical element of our overall security policies.

We have successfully tested the integrated IPSec support in z/OS which enables end-to-end encryption from the mainframe all the way to the end device and plan to put into production soon. With the announcement of the zIIP Assisted IPSec, this solution delivers greater value to our business because of the improved price / performance provided by the zIIP specialty engine."

Ingemar Gustafson,
Manager of zSeries Networking
Svenska Handelsbanken

Svenska Handelsbanken has worked with IBM for many years. The IBM mainframe is a key element of our infrastructure, hosting our critical applications and data. Our mainframe connections were historically secured end-to-end with proprietary SNA connections. As we moved to an all Internet environment, we have implemented end-to-end encryption with IPSec on z/OS for our most secure connections.

The announcement of zIIP Assisted IPSec will improve the economics of this solution as much of the IPSec work can be directed lo the lower cost zIIP engines. This will enable our company to expand our use of IPSec-communications directly from our mainframe to our internal servers and to other financial institutions. The ability to use the zIIP engines for much of the IPSec encryption and decryption is a most welcomed enhancement to the overall security solution provided on IBM System z.

How zAAPs and zIIPs are similar

- Both run asynchronously to general purpose processors
- Neither can run z/OS or be IPLed with z/OS (or any other operating system)
- Both receive eligible work from z/OS
- Both support z/OS 1.6 or later
- IBM does not impose any IBM software charges on either
- As of the date of this publication there are no known instances where an ISV has imposed software charges on either
- Both have the same price (US$125,000 on the z9 EC and US$95,000 on the z9 BC)
- Both have the same technology dividend (buy once and upgrade at no additional charge)
- PROJECTCPU tool can measure the eligible workload for both
- RMF™ monitors both zAAP and zIIP activity
- WLM manages both zAAP and zIIP workloads

How zAAP and zIIP are different

zAAP	zIIP
Introduced in 2004.	**Introduced in** 2006.
System z Application Assist Processor **(originally the zSeries Application Assist Processor). Available on IBM System z9 Enterprise Class and Business Class (z9 EC, z9 BC) and IBM eServer**™ **zSeries**® **990 and 890 (z990, z890).**	System z9 Integrated Information Processor. **Available on IBM System z9 Enterprise Class and Business Class (z9 EC and z9 BC). Available on System z9 servers only.**
Intended to help implement new application **technologies on System z, such as Java and XML.**	**Intended to help integrate** data and transaction **processing across the enterprise and on to System z9.**
Underlying technology is z/OS ability to re-direct portions of TCB mode **work to the zAAP.**	**Underlying technology is z/OS ability to re-direct portions of** enclave SRB **work to the zIIP.**

Exploiters include:
•**ANYTHING that uses Java via the IBM SDK (IBM Java Virtual Machine (JVM)) such as:**
  ➢**WebSphere**® **Application Server**
  ➢**IMS**™
  ➢**DB2**
  ➢**CICS**®
  ➢**Java batch**
•z/OS XML System Services
	Exploiters include:
	•**DB2 for z/OS**
	  ➢ **Data serving**
	  ➢ **Data Warehousing**
	•z/OS Communications Server
	  • **Network encryption**
	•z/OS XML System Services (SOD*)

zIIP analyze of a typical SAP database server
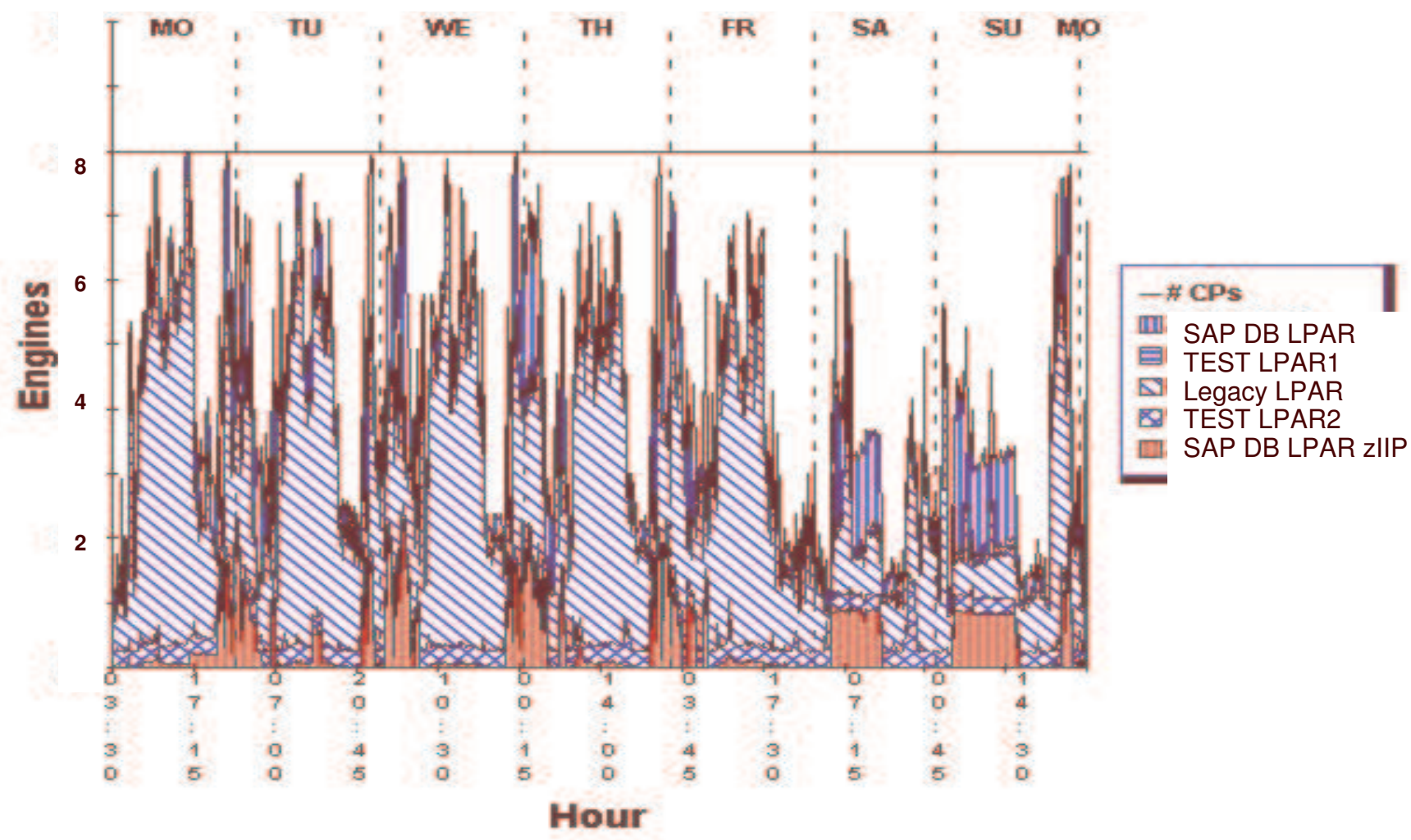
Sample RMF Workload Activity Report with zIIP enablement code

IIP : Effective zIIP % using zIIP installed engines   IIPCP : Projected zIIP % if zIIP engines where installed

Parameter Options Summary

★ zAAP

IEAOPTxx
PROJECTCPU=YES|NO
ZAAPAWMT=
IFAHONORPRIORITY=YES|NO

★ zIIP

IEAOPTxx
PROJECTCPU=YES|NO
ZIIPAWMT=

JVM Options (Application Level)
- -Xifa:projectn
- -Xifa:ON|OFF
- -Xifa:Force

◆ **The JAVA5 JVM support for -Xifa:projectn has been removed**
➤ **Use RMF and either -Xifa:Force or ProjectCPU=Yes to project zAAP CPU**