

## zSeries Explorers



# ZAAP

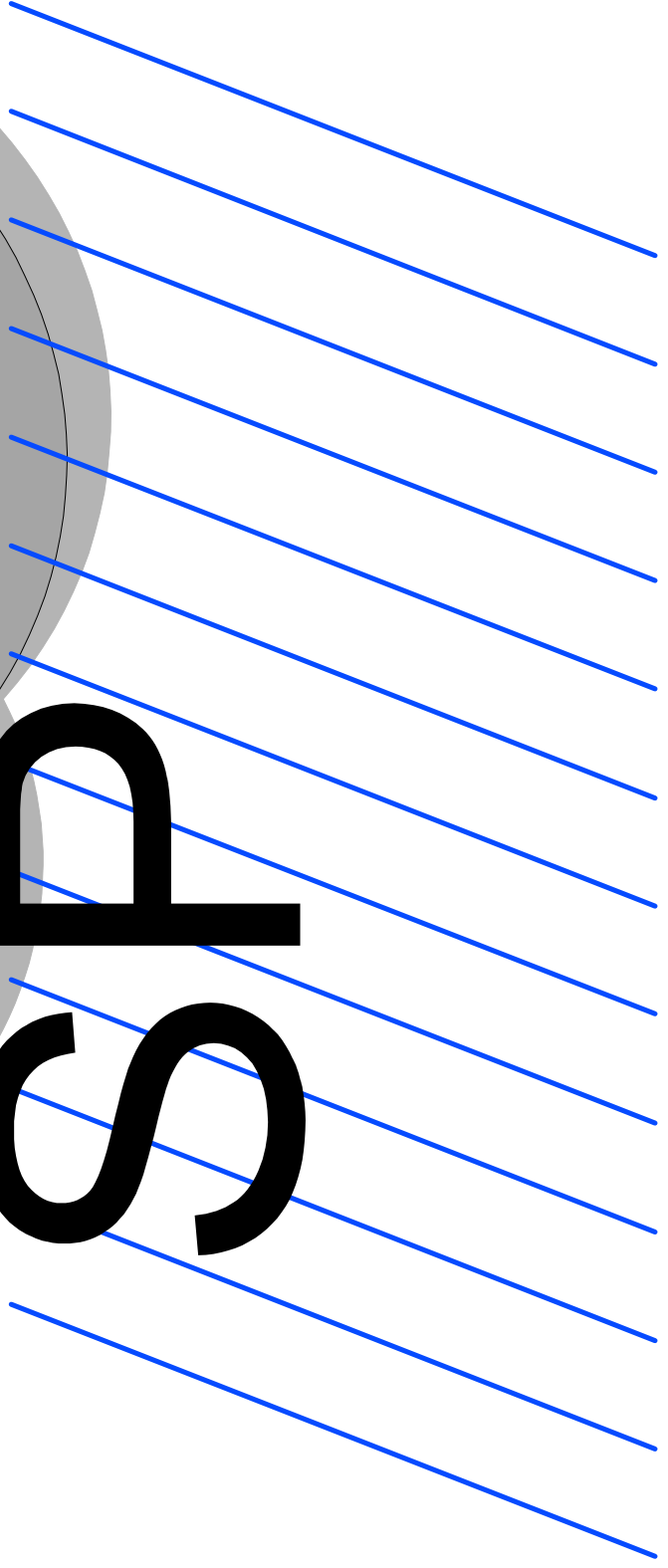
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**ZAAP**

**SP**





IBM Systems Group

# IBM zSeries zAAP

## z890/z990 - IBM eServer zSeries Application Assist Processor (zAAP)

- **Orderable by feature code (FC 6520 for z890 and FC 0520 for z990), up to one for each CP or unassigned CP (for z990) configured on the processor**
- **The zAAP assist can run all Java code**
- **zAAPs are designed so that users can manage the use of CPs such that Java code runs only on a CP, only on a zAAP, or on both**
- **Subsystems that exploit (or will exploit) zAAPs include:**
  - ▶ WAS 5.1
  - ▶ CICS®/TS 2.3
  - ▶ DB2 V7 w/PTF UQ81669 (APAR PQ76769)
  - ▶ DB2 V8
  - ▶ IMS™ V7 with PTF UQ80879, UQ82427
  - ▶ IMS™ V8
  - ▶ IMS™ V9
  - ▶ WebSphere WBI Brokers V5 for z/OS
- **Other Software**
  - ▶ z/OS 1.6 or z/OS.e 1.6 (z890)
  - ▶ IBM SDK 1.4 for z/OS, Java 2 Technology Edition, with PTF (or later) for APAR PQ86689
  - ▶ IBM, Vendor and Customer Java applications are expected to run without modification

## z890/z990 - Sources for zAAP Information

- **Sources for zAAP information**

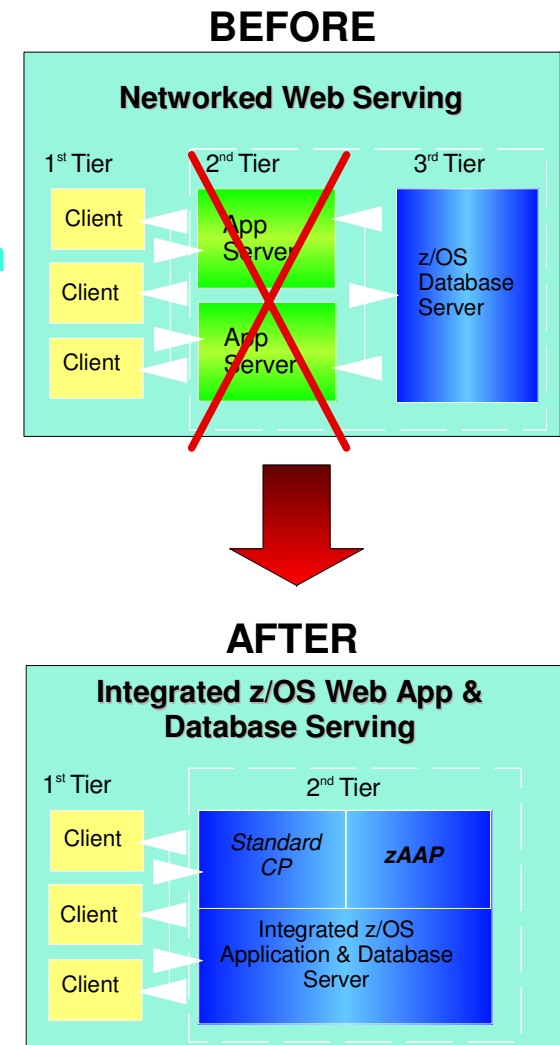
- ▶ The main page for the zAAP can be found at:
  - <http://www-1.ibm.com/servers/eserver/zseries/zaap/gettingstarted/>
- ▶ The white paper can be reached at:
  - <http://www-1.ibm.com/support/techdocs/atmastr.nsf/WebIndex/WP100417>
- ▶ The tools supporting the announcement can be downloaded from:
  - <http://www6.software.ibm.com/dl/zosjava2/zosjava2-p>
    - (registration will be required)

# The zSeries Application Assist Processor (zAAP)

- ❑ Available on the zSeries 990 and zSeries 890 servers
- ❑ An *attractively priced* specialized processor unit that provides an *economical Java execution environment*
- ❑ zAAPs are configured with general-purpose processors within logical partitions running z/OS
  - *zAAPs are designed to operate asynchronously with the general purpose processor to execute Java programming under control of the IBM Java Virtual Machine (JVM)*
  - *zAAPs only run Java code under control of the IBM JVM*
  - *On z890, the zAAP is a full speed engine*
- ❑ IBM does not impose software charges on zAAP capacity
  - *zAAPs brings additional processing power exclusively for Java application execution without affecting the total MSU rating or machine model designation*

# Integration and Infrastructure Simplification

- ❑ zAAPs can help consolidate, simplify and reduce server infrastructure
  - Improve operational efficiencies.
  - Enables strategic integration of e-business applications with mission-critical database workloads
  - Potential operational advantages over distributed multi-tier solutions
- ❑ Eliminates separate tier to handle application server workload
  - Remove one hardware tier
  - Remove one TCP/IP link
- ❑ Leverage core zSeries strengths and manage Java Workloads automatically with z/OS
  - zSeries Security, Workload Manager (WLM)
  - zSeries Availability, Scalability, Flexibility



## The new zSeries Application Assist Processor (zAAP)

- Execution of Java processing cycles on a zAAP is a function of :
  - The Software Developer's Kit (SDK) for z/OS, Java 2 Technology Edition, V1.4 with PTF for APAR PQ86689
  - z/OS V1.6 or z/OS.e V1.6
  - Processor Resource/Systems Manager (PR/SM)

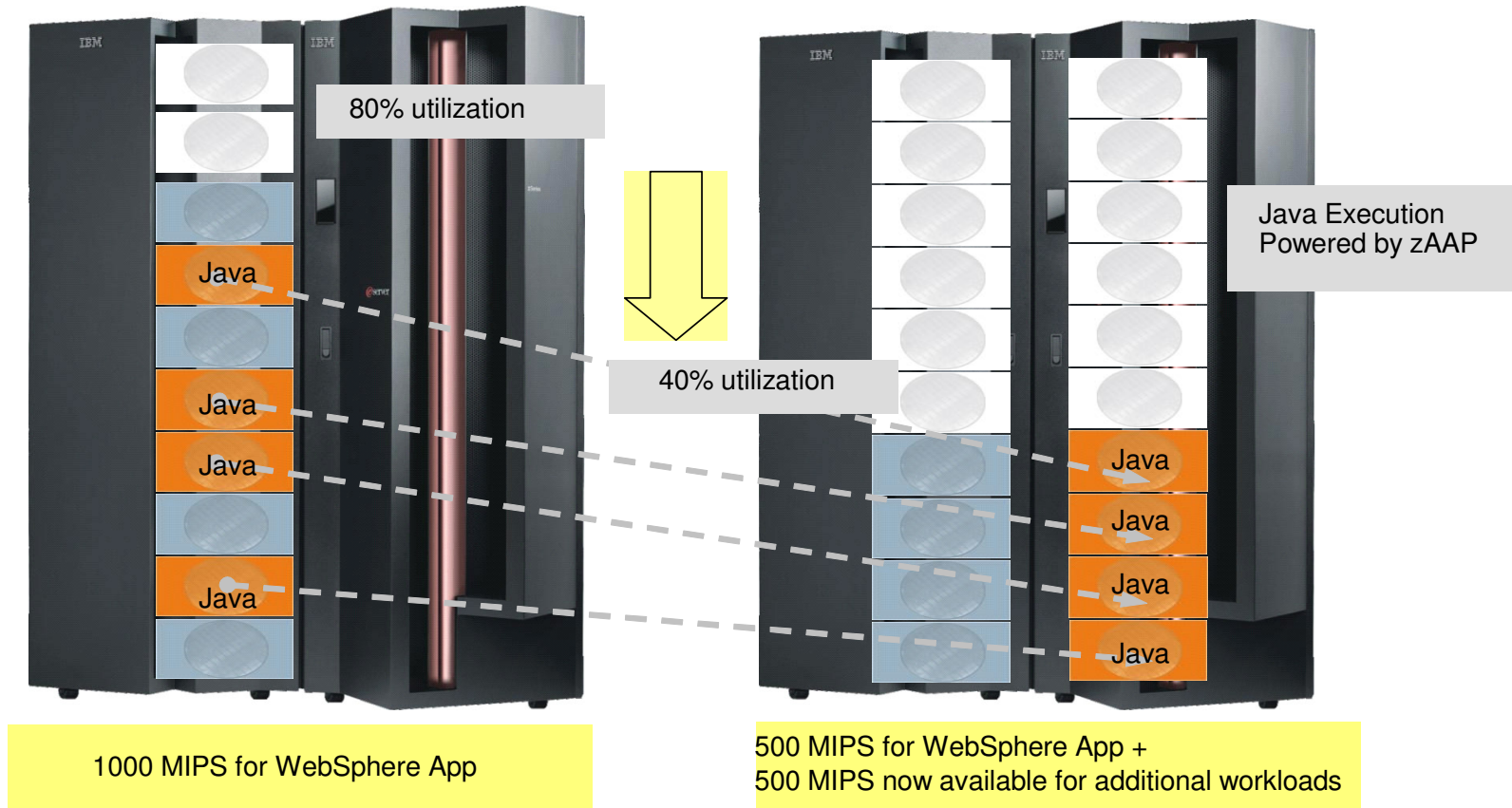
- No anticipated modifications to the Java applications

Objective: Enable integration of Java based Web applications with core z/OS backend database environment for high performance, reliability, availability, security, and lower total cost of ownership



# zAAP Concept Overview: A Simplified Example...

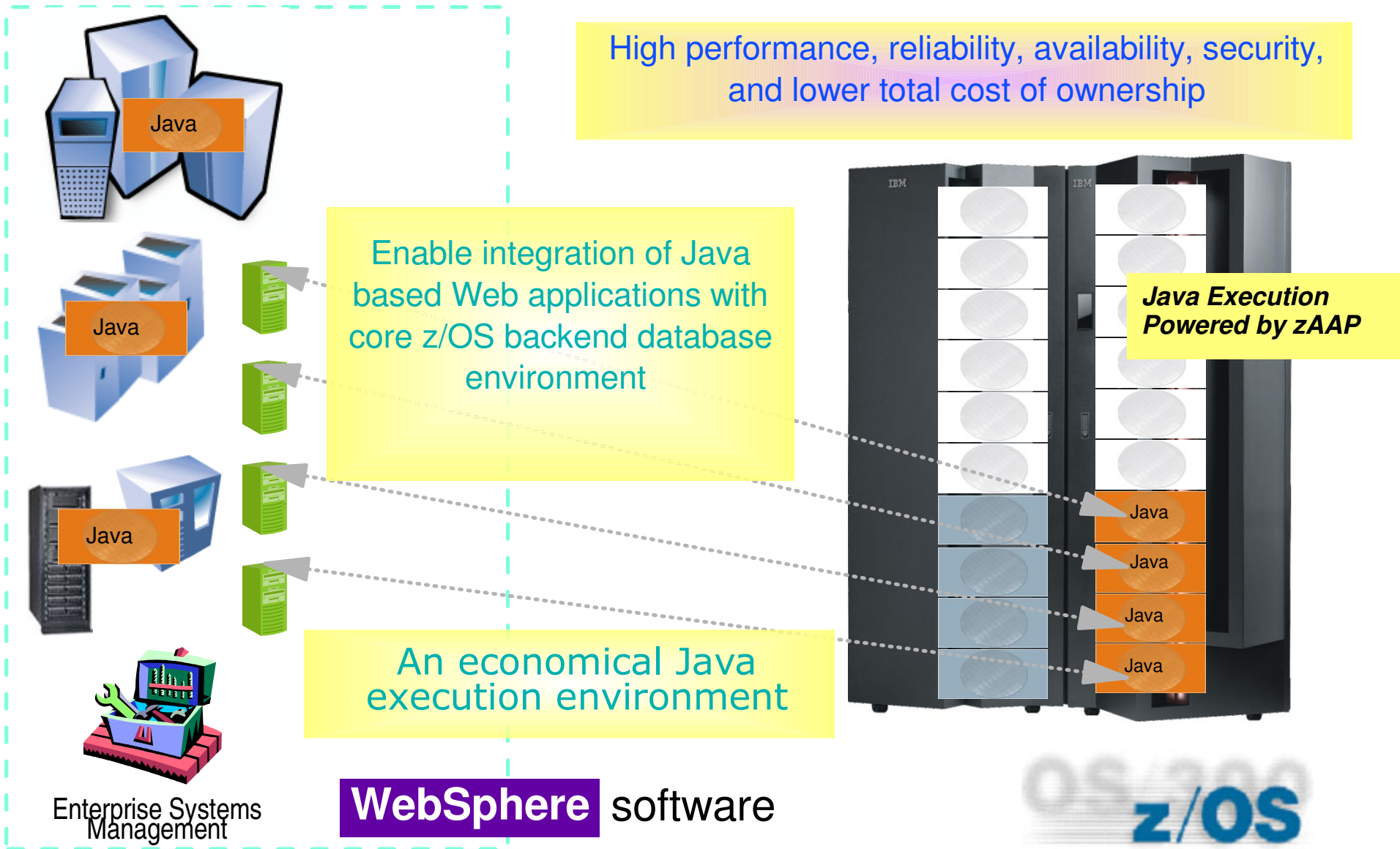
Consider a WebSphere Application that is transactional in nature and requires 1000 MIPS today on zSeries.



**In this example, with zAAP, we can reduce the standard CP capacity requirement for the Application to 500 MIPS or a 50% reduction.**

*\* For illustrative purposes only*

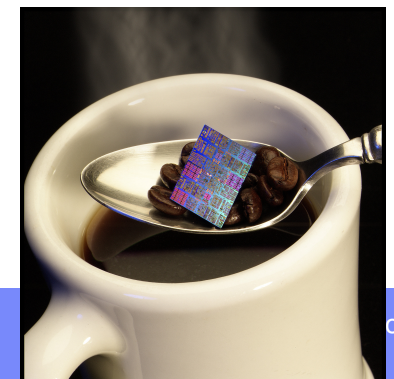
# Another simplified example...



# Technical Overview

## zAAP Operational controls

- IBM z990 or z890 server LPAR Configuration**
  - Logical Partition Image profile - Processors
  - LPAR Controls – Processing Weights
- z/OS 1.6 Dispatcher options**
  - PARMLIB member IEAOPTxx
  - IFAHONOR\_PRIORITY = Yes/No
  - IFACrossover = Yes/No
- JVM runtime options**
  - -Xifa: on, off, force, projectn



# The zSeries Application Assist Processor (zAAP)

- ❑ zAAPs are configured in the logical partition image profile
- ❑ zAAPs and standard CPs may be defined as either shared or dedicated processors
  - *Shared CPs and zAAPs belong to different processor pools*
  - *Capping option and Processing Weights defined to the logical partition apply to CPs and zAAPs*
- ❑ The logical partition processing weights
  - *(INITIAL, MIN, MAX)*
  - *Are applied independently to the shared CPs and to the shared zAAPs configured to the logical partition*
- ❑ z/OS WLM does NOT manage shared zAAPs

# Partition image profile

Customize Activation Profiles : SCZP901

**Logical processor assignment**

Dedicated central processors

Dedicated central processors and integrated facility for application

Not dedicated central processors

**Not dedicated central processors and integrated facility for application**

**Not dedicated processor details**

Initial processing weight  1 to 999  Initial capping

Enable WorkLoad Manager

Minimum processing weight

Maximum processing weight

Number of processors - Initial  Reserved

Number of integrated facility for application - Initial  Reserved

**Initial / Reserved**

- > CPs
- > IFAs

**Note**

IFA = zAAP

SCZP901:A07

SCZP901:A08

SCZP901:A09

SCZP901:A11

SCZP901:A12

SCZP901:A13

SCZP901:A14

SCZP901:A17

SCZP901:A18

SCZP901:A19

SCZP901:A1A

SCZP901:A1B

SCZP901:A1D

General
Processor
Security
Storage
Options
Load
PCI Crypto

## zAAP characteristics

### □ zAAPs

- *Cannot be IPLed*
- *Only executes z/Architecture™ mode instructions*
- *Do not support manual operator controls*
  - *No PSW Restart, LOAD or LOAD derivatives*
- *Do not respond to SIGP requests unless enabled by a z/OS that supports zAAPs*
- *No I/O interrupts nor Clock Comparator interrupts*
- *Additional architecture differences are anticipated in future implementations*

### □ The z/OS design accommodates zAAP differences

# HMC – CPC Details

SCZP901 Details

**Instance information**

CP Status:	Operating	Activation profile:	SCZP901
CHPID Status:	Exceptions	Last used profile:	not set
Group:	CPC	Service state:	Disabled
IOCDS identifier:	A1	Maximum CPs:	10
IOCDS name:	IODF49	Maximum ICFs/IFLs/IFAs:	6

Lockout disruptive tasks:  Yes  No

System mode: Logically partitioned      Dual AC power maintenance: Fully Redundant

Alternate SE Status: Operating      CP Assist for Cryptographic Functions: Installed

**Acceptable CP/CHPID status**

<input checked="" type="checkbox"/> Operating - <span style="color: green;">■</span>	<input type="checkbox"/> Power save - <span style="color: brown;">■</span>	<input type="checkbox"/> No power - <span style="color: black;">■</span>
<input type="checkbox"/> Not Operating - <span style="color: red;">■</span>	<input type="checkbox"/> Exceptions - <span style="color: green;">■</span>	<input type="checkbox"/> Status check - <span style="color: magenta;">■</span>
<input checked="" type="checkbox"/> Acceptable - <span style="color: yellow;">■</span>	<input type="checkbox"/> Service Required - <span style="color: yellow;">■</span>	<input type="checkbox"/> Degraded - <span style="color: gray;">■</span>

**Product information**

Machine type / Model:	002084 / B16-310	Manufacturer:	IBM
Machine serial:	02 - 0026A3A	CPC serial:	000020026A3A
Machine sequence:	000000026A3A	CPC location:	A19B
Plant of manufacture:	02	CPC identifier:	00

Save	Change Options...	Recreate reasons...	Cancel	Help
------	-------------------	---------------------	--------	------

Max CPs  
Max  
ICFs/IFLs/zAAPs

Note  
IFA = zAAP



# SE CPC Work Area

SCZP901: Primary Support Element Workplace (Version 1.8.2)

**Views**

- Groups
- Exceptions
- Active Tasks
- Console Actions
- Task List

SCZP901

- CPS
- Channels
- PCI Crypto

Area

SCZP901 CPs Work Area

00 Online Operating	02 Online Operating	05 Online Operating	07 Online Operating	08 Online Operating	0A Online Operating	0C Online Operating	0E Online Operating
10 Online Operating	12 Online Operating	15 Online Operating	17 Online Operating	18 Online Operating	1A Online Operating	1C Online Operating	1E Online Operating

➤ Right click on CPC,  
➤ Select CPs to reach CPs Work Area

10 CPs plus 6 [ICFs, IFLs and IFAs (zAAPs)]

# Image CPs Work Area

The screenshot displays the SCZP901 Primary Support Element Workplace (Version 1.8.2) interface. The window title is "SCZP901 - State Active - Keystrokes remote". The menu bar includes "Keystrokes", "Session", "Services", and "Help".

The main workspace is divided into two sections:

- Views (Red Panel):** Contains icons for "Groups", "Exceptions", "Active Tasks", "Console Actions", "Task List", and "Books".
- A13 CPs Work Area:** Displays three online operating system icons labeled "00 Online Operating", "01 Online Operating", and "02 Online Operating".

A vertical toolbar on the right side of the interface includes the following options:

- Daily
- Hardware Messages
- Operating System Message (highlighted with a blue border)
- Activate
- Reset Normal
- Deactivate
- Grouping
- Activity
- Help

# Z990 HMC – LPAR Controls

Only two *NON-DEDICATED* Pools

- CPs
- ICFs Pool contains ICFs, IFLs and IFAs (zAAPs)

Initial	Minimum	Maximum	Initial	Current	Non-	Non-dedicated	Integrated	Logical
Processing	Processing	Processing	Capping	Capping	dedicated	Central	Coupling	Partition
Weight	Weight	Weight			Processors	Processors	Processors	
<input type="checkbox"/> 50	<input type="checkbox"/> 0	<input type="checkbox"/> 0	<input type="checkbox"/> No	No	3	0	A0A	
<input type="checkbox"/> 10	<input type="checkbox"/> 0	<input type="checkbox"/> 0	<input type="checkbox"/> No	No	2	0	A0B	
<input type="checkbox"/> 20	<input type="checkbox"/> 0	<input type="checkbox"/> 0	<input type="checkbox"/> No	No	2	0	A0C	
<input type="checkbox"/> 10	<input type="checkbox"/> 0	<input type="checkbox"/> 0	<input type="checkbox"/> No	No	0	1	A0D	
<input type="checkbox"/> 10	<input type="checkbox"/> 0	<input type="checkbox"/> 0	<input type="checkbox"/> No	No	0	1	A0E	
<input type="checkbox"/> 10	<input type="checkbox"/> 0	<input type="checkbox"/> 0	<input type="checkbox"/> No	No	0	1	A0F	
<input type="checkbox"/> 20	<input type="checkbox"/> 0	<input type="checkbox"/> 0	<input type="checkbox"/> No	No	1	0	A01	
<input type="checkbox"/> 20	<input type="checkbox"/> 0	<input type="checkbox"/> 0	<input type="checkbox"/> No	No	2	0	A02	
<input type="checkbox"/> 50	<input type="checkbox"/> 0	<input type="checkbox"/> 0	<input type="checkbox"/> No	No				
<input type="checkbox"/> 40	<input type="checkbox"/> 0	<input type="checkbox"/> 0	<input type="checkbox"/> No	No				

Processing Weight applies to both pools

## z/OS Configuration Execution Options

- Options in z/OS Parmlib member IEAOPTxx
- The selected execution option can be dynamically changed
  - SET OPT command
- Java Crossover - IFACrossover = Yes
  - Java by Priority IFA - HONOR\_PRIORITY = Yes
  - Java Discretionary Crossover - IFAHONOR\_PRIORITY = No
- No Java Crossover - IFACrossover = No

## z/OS dispatcher options

### Java Crossover - IFACrossover = Yes

- Java by Priority - IFAHONORPRIORITY = Yes**
  - *Standard CPs execute both Java and non-Java work in priority order*
  - *zAAPs execute Java work only, in priority order*

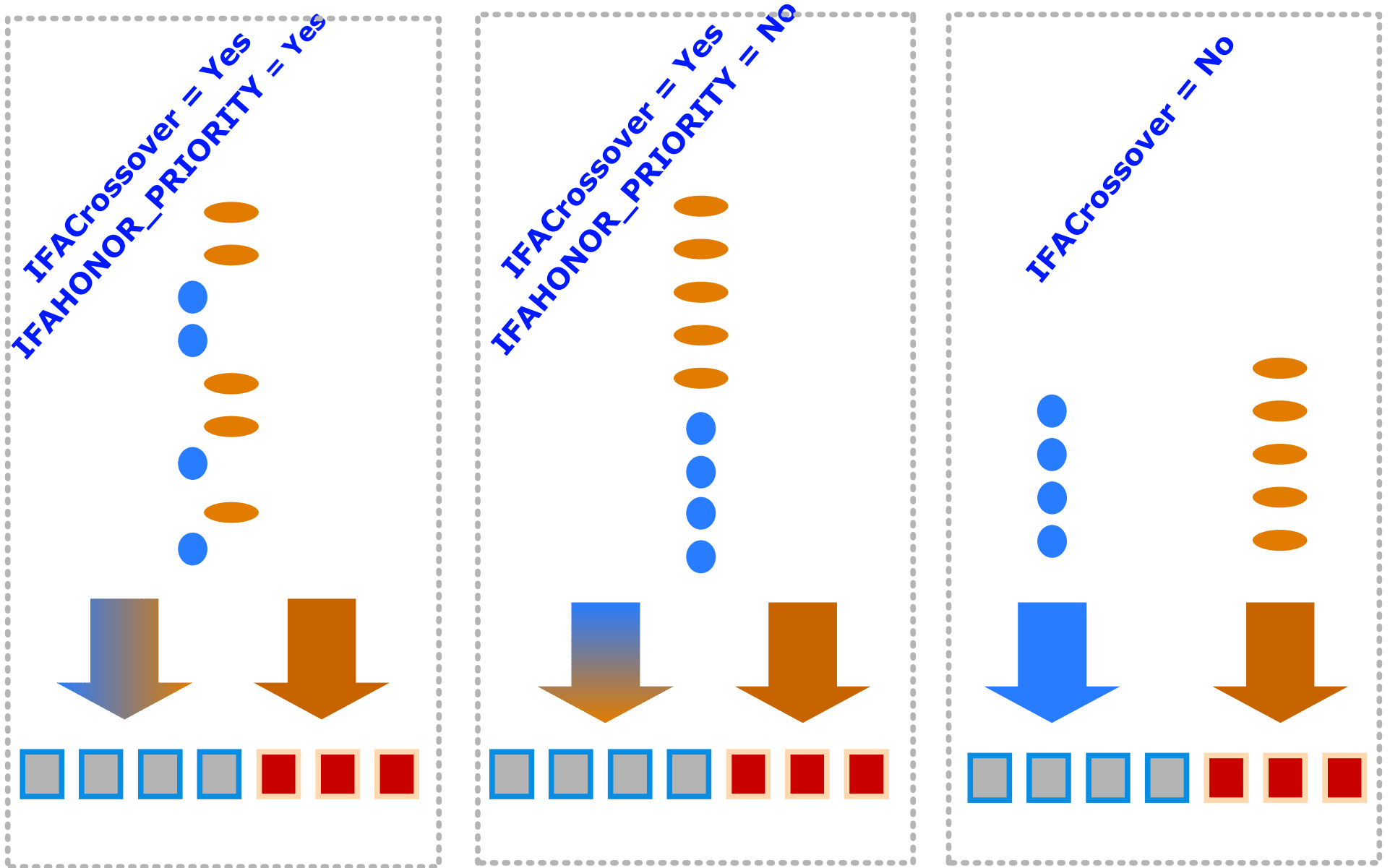
- Java Discretionary Crossover - IFAHONORPRIORITY = No**

- *Standard CPs execute non-Java work in priority order and Java work in priority order only when there is no non-Java work to execute*
- *zAAPs execute Java work only, in priority order*

### No Java Crossover - IFACrossover = No

- Standard CPs execute non-Java work only, in priority order*
- zAAPs execute Java work only, in priority order*

# z/OS dispatcher options



# JVM options

## ❑ **-Xifa:on**

- Enables Java work to be run on the zAAP if the zAAPs are available. This setting is assumed by default.

## ❑ **-Xifa:off**

- Disables use of the zAAP

## ❑ **-Xifa:projectn**

- Designed to estimate projected zAAP usage and write this information to STDOUT at intervals of **n** minutes. The option is primarily intended for assessing potential zAAP use on versions before z/OS 1.6

## ❑ **-Xifa:force**

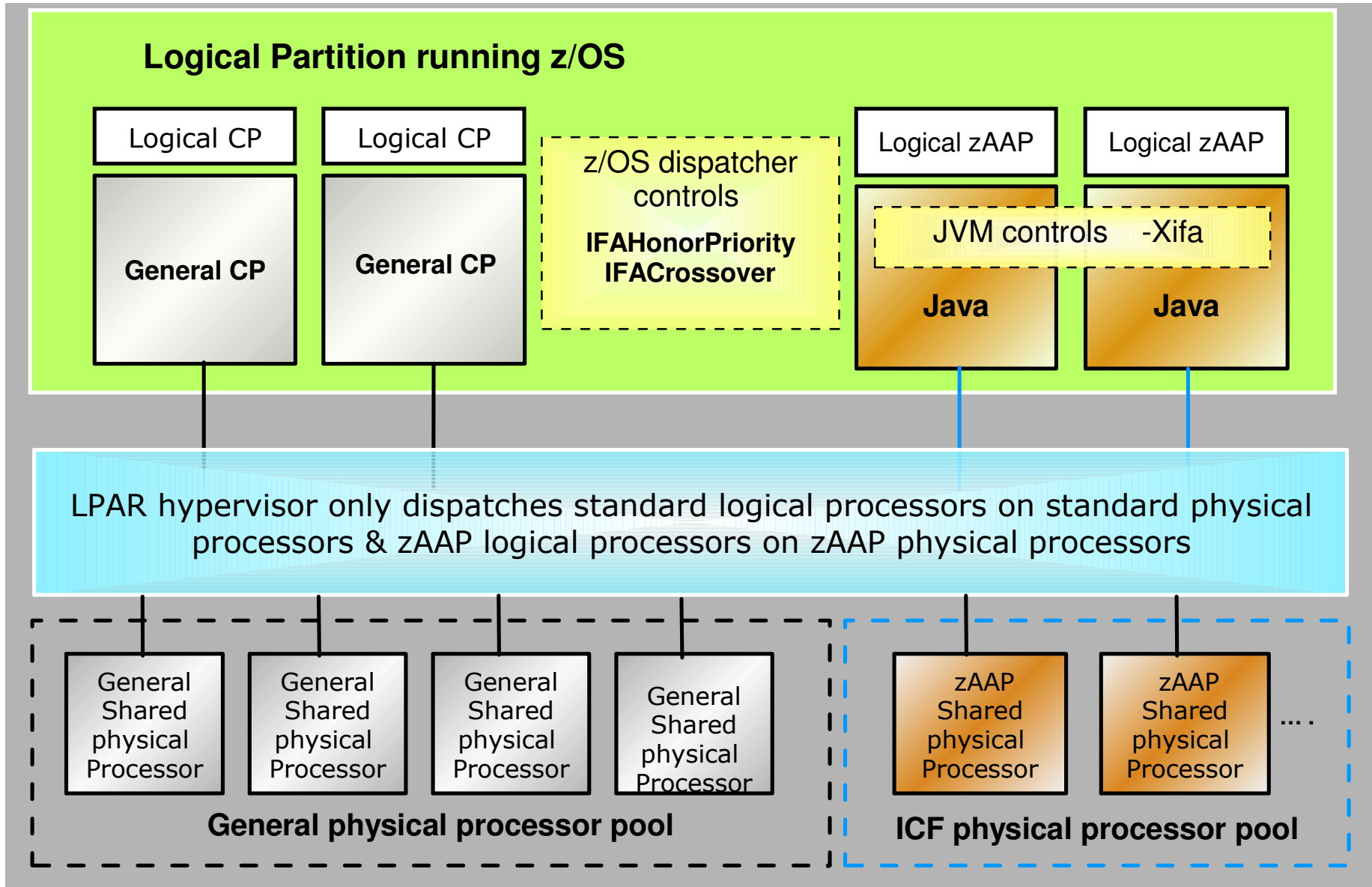
- Designed to force Java to continue attempting to use zAAP, even if none are available. This option is honored only with the zAAP support delivered with z/OS 1.6. This would typically be specified for the purpose of collecting RMF/SMF data to assess potential zAAP use.

# IBM SDK for z/OS, Java 2 Technology Edition, SDK V1.4

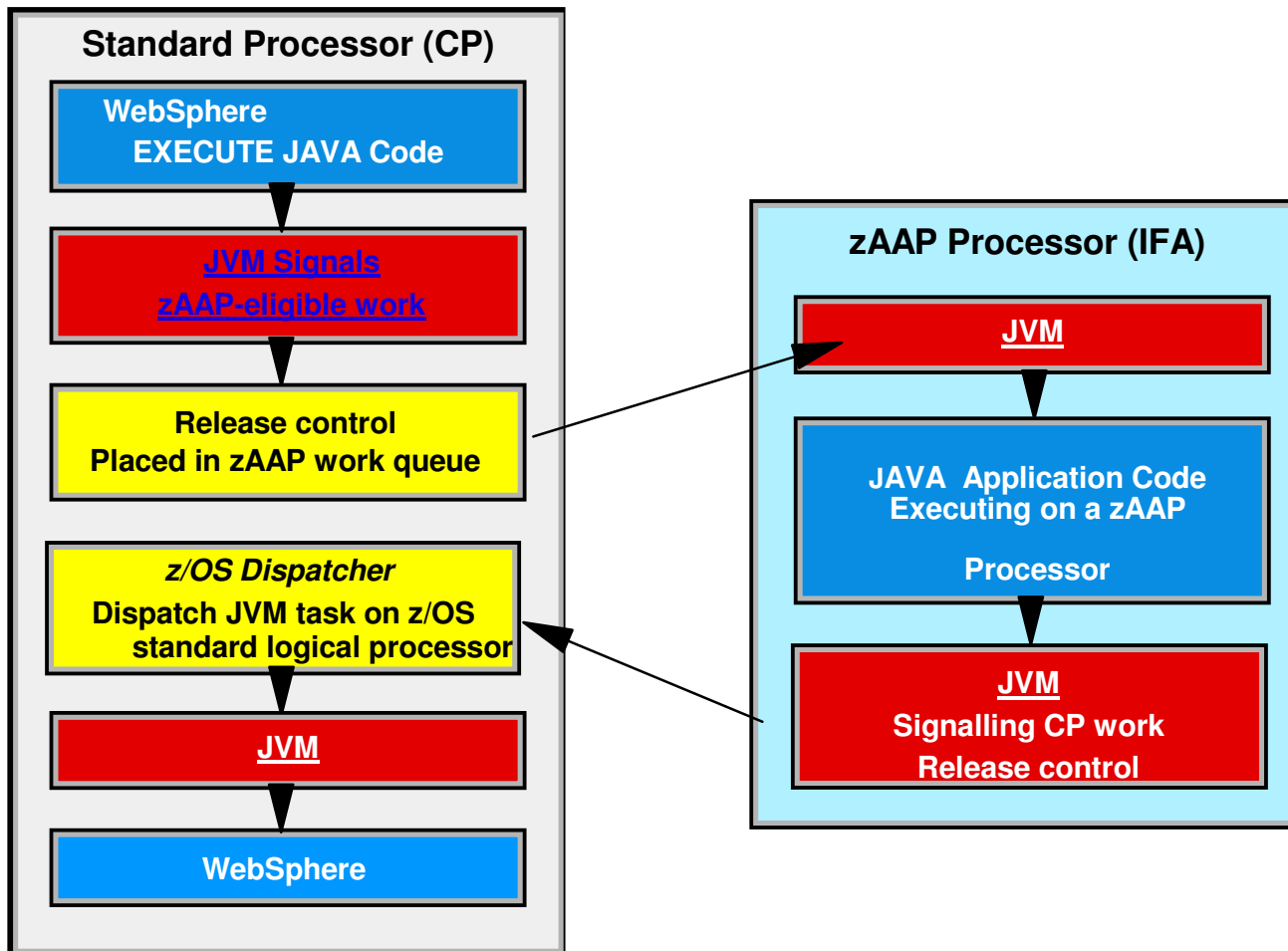
<i>Subsystem</i>	<i>IBM SDK for z/OS, Java 2 Technology Edition, SDK V1.4</i>
WebSphere Application Server V5.02	
WebSphere Application Server V5.1	Yes
IMS V7.1	Yes
IMS V8.1	Yes
IMS V9.1	Yes
CICS TS V2.2	
CICS TS V2.3	Yes
DB2 V7.1	Yes
DB2 V8.1	Yes



# Logical Partition – Shared CPs and zAAPs



# Executing Java under **IBM JVM** control



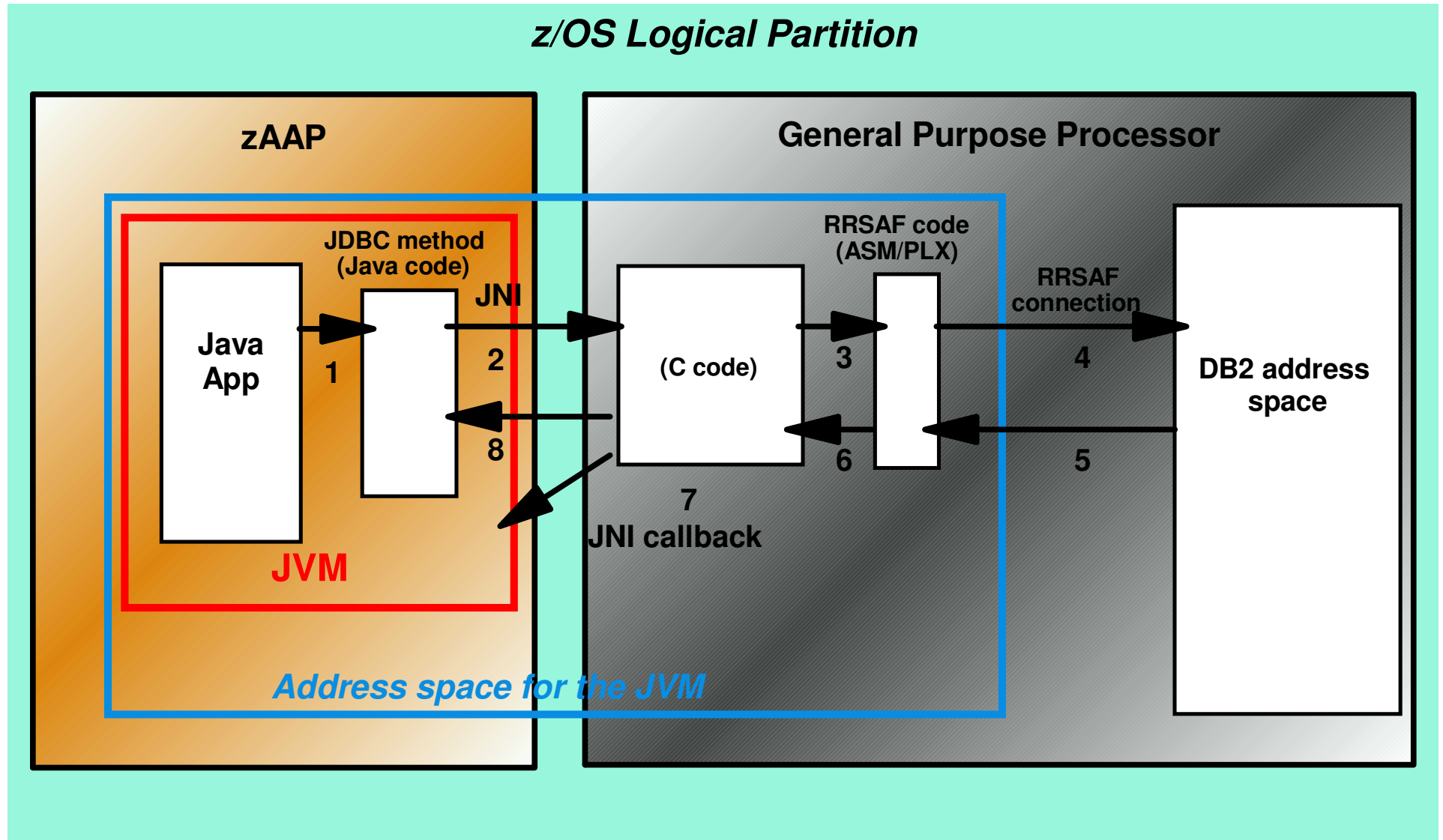
IBM JVM communicates to z/OS dispatcher when zAAP-eligible code is to be executed

When Java work is to be executed, the work unit is set *zAAP-eligible*

Non zAAP-eligible work only dispatched on standard CPs

zAAP-eligible work dispatched according to runtime options set in JVM and IEAOPTxx

# Java App calling DB2



# Installation Planning

# HW/SW Requirements

- ❑ IBM z990 or z890 PR/SM
  - zAAPs configured with general purpose CPs within z/OS logical partitions
    - *DED or SHARED*
- ❑ z/OS 1.6 (or z/OSe 1.6)
  - *zAAPs not recognized by z/OS release prior to 1.6*
    - SMF, RMF
- ❑ IBM SDK for z/OS, Java 2 Technology Edition V1.4
  - *with PTF for APAR PQ86689*
  - Subsystems and Applications using SDK 1.4
    - WebSphere V5.1 for z/OS
    - CICS TS 2.3, IMS V8, DB2 V8
    - Other ...

## zSeries configuration rules

- ❑ The number of zAAPs cannot exceed the number of CPs plus unassigned CPs in the server.
  - *One CP must be installed with or prior to any zAAP being installed*
- ❑ On z990, up to four zAAPs can be characterized per book.
  - *You need an IBM 2084 model D32 with a total of 16 assigned and unassigned CPs to assign 16 zAAPs.*
- ❑ On z890, the zAAP is a full speed engine
- ❑ IBM does not impose software charges on zAAP capacity
  - *Additional IBM software charges will apply when additional CP capacity is used*

# Concurrent Upgrade

- ❑ zAAPs can be concurrently added to a configuration via
  - Capacity Upgrade on Demand (CUoD)
  - Customer Initiated Upgrade (CIU)
  - On/Off Capacity on Demand (On/Off CoD)
- ❑ With On/Off CoD
  - The number of On/Off CoD active zAAPs (#9893) may not exceed the current number of zAAPs (#0520) that are permanently purchased
  - The total number of On/Off CoD active zAAPs (#9893) plus zAAPs (#0520) may not exceed
    - *The number of On/Off CoD Active CPs (#9897)*
    - *Plus the number of CPs (#0716)*
    - *Plus the number of unassigned CPs (#1716).*
- ❑ *Usual Initial/Reserved rule apply for non-disruptive addition of zAAPs*
- ❑ *zAAPs cannot be assigned via Capacity Backup Upgrade*

## z990 and z/OS scalability

- ❑ In conjunction with z/OS V1.6, the maximum number of *combined zAAPs and CPs* supported on the z990 server in a single LPAR is 24
  - *When using the new IBM zSeries Application Assist Processor (zAAP) the total number of processors defined in a z/OS V1.6 logical partition is the sum of general purpose processors (CPs) and zSeries Application Assist Processors (zAAPs).*
- ❑ In 2005, IBM plans to provide support for z/OS V1.6 to run up to 32 processors in a single logical partition on a z990
- ❑ You can scale up in a single logical partition, and scale out in a parallel sysplex for higher availability.



## zAAP configurations

<i>Z990</i>	<i>Max #zAAPs</i>	<i>Max LPAR CP+zAAP</i>
A08	4	4+4
B16	8	8+8
C24	12	12+12
D32	16	Any combination from 8+16 to 16+8

<i>Z890</i>	<i>Max #zAAPs</i>	<i>Max LPAR CP+zAAP</i>
1xx	1	1+1
2xx	2	2+2
3xx	1	3+1
4xx	0	4+0

On z890, the zAAP is a full speed engine

## z/OS 1.6 RMF / SMF Support

- ❑ RMF supports zAAP processors
  - *Postprocessor CPU activity report and Workload report*
  - *Monitor III Enclave report*
- ❑ Support is shipped as SPE (APAR OA05731)
  - *PTFs available for z/OS V1.5 RMF*
- ❑ RMF distinguishes between standard CP and zAAP processors
  - *Collects and reports about zAAP service times*
  - *Collects and reports about zAAP delay states for service and report class periods*
  - *For z890, zAAP CPU time is normalized to CP speed*
- ❑ SMF record types
  - *SMF type 30 and type 72 records have been enhanced to provide zAAP usage information*

## z/OS V1.5 on z990 - D M=CPU

**RESPONSE=SC49****IEE174I 16.00.24 DISPLAY M 771****PROCESSOR STATUS**

<b>ID</b>	<b>CPU</b>	<b>SERIAL</b>
0	+	036A3A2084
1	+	036A3A2084
2	-	

**CPC ND = 002084.B16.IBM.02.000000026A3A****CPC SI = 2084.310.IBM.02.0000000000026A3A****CPC ID = 00****CPC NAME = SCZP901****LP NAME = A03      LP ID = 3****CSS ID = 0****MIF ID = 3**

2 x CPs  
1 x zAAP offline  
(not supported)

CPC ND CENTRAL PROCESSING COMPLEX NODE  
DESCRIPTORCPC SI SYSTEM INFORMATION FROM STSI  
INSTRUCTION

CPC ID CENTRAL PROCESSING COMPLEX IDENTIFIER

CPC NAME CENTRAL PROCESSING COMPLEX NAME

LP NAME LOGICAL PARTITION NAME

LP ID LOGICAL PARTITION IDENTIFIER

CSS ID CHANNEL SUBSYSTEM IDENTIFIER

**+ ONLINE****- OFFLINE****. DOES NOT EXIST****W WLM-MANAGED****N NOT AVAILABLE**

## z/OS V1.6 on z990 - D M=CPU

```
IEE174I 16.11.12 DISPLAY M 703
```

```
PROCESSOR STATUS
```

ID	CPU	SERIAL
00	+	136A3A2084
01	+A	136A3A2084
02	-A	
03	-A	
04	-A	
05	-A	
06	-A	
07	NA	

```
CPC ND = 002084.B16.IBM.02.000000026A3A
CPC SI = 2084.310.IBM.02.0000000000026A3A
CPC ID = 00
CPC NAME = SCZP901
LP NAME = A13          LP ID = 13
CSS ID = 1
MIF ID = 3
```

1 x CP online  
 1 x zAAP online  
 5 x zAAPs offline  
 1 x zAAP Not Available

A =Assist processor = zAAP

**+ ONLINE**  
**- OFFLINE**  
**. DOES NOT EXIST**  
**W WLM-MANAGED**  
**N NOT AVAILABLE**  
**A ASSIST PROCESSOR**

# CPU Activity Report

```

                                C P U   A C T I V I T Y

                                z/OS V1R6                SYSTEM ID SC70                DATE 07/13/2004                INTERVAL 09.59.927
                                RPT VERSION V1R5 RMF        TIME 18.00.00                CYCLE 1.000 SECONDS

CPU 2084  MODEL 310
---CPU--- ONLINE TIME  LPAR BUSY      MVS BUSY      CPU SERIAL  I/O TOTAL      % I/O INTERRUPTS
NUM TYPE  PERCENTAGE  TIME PERC     TIME PERC     TIME PERC     NUM  TYPE      INTERRUPT RATE  HANDLED VIA TPI
 0  CP    100.00      12.51         14.92         136A3A      148.0          1.73
CP  TOTAL/AVERAGE  12.51         14.92
 1  IFA   100.00      49.72         98.16         136A3A
 2  IFA   100.00      49.72         98.15         136A3A
IFA  AVERAGE      49.72         98.16

```

## Note

IFA = zAAP

# CPU Activity & Partition Data Report

CPU ACTIVITY																	
MVS PARTITION NAME							A13		NUMBER OF PHYSICAL PROCESSORS				16				
IMAGE CAPACITY							538		CP				10				
NUMBER OF CONFIGURED PARTITIONS							30		ICF				6				
WAIT COMPLETION							NO										
INTERVAL							DYNAMIC										
PARTITION DATA							LOGICAL PARTITION PROCESSOR DATA				AVERAGE PROCESSOR UTILIZATION PERCENTAGES						
-----MSU-----							---DISPATCH TIME DATA---				LOGICAL PROCESSORS		--- PHYSICAL PROCESSORS ---				
NAME	S	WGT	DEF	ACT	DEF	WLM%	PROCESSOR-	NUM	TYPE	EFFECTIVE	TOTAL	EFFECTIVE	TOTAL	LPAR	MGMT	EFFECTIVE	TOTA
A13	A	10	0	7	NO	0.0	1	CP	00.01.13.115	00.01.15.052	12.19	12.51	0.03		1.22	1.25	
A0A	A	50	0	4	NO	0.0	2	CP	00.00.39.218	00.00.42.670	3.27	3.56	0.06		0.65	0.71	
A0B	A	10	0	2	NO	0.0	2	CP	00.00.24.107	00.00.25.155	2.01	2.10	0.02		0.40	0.42	
A0C	A	20	0	6	NO	0.0	2	CP	00.01.05.904	00.01.09.106	5.49	5.76	0.05		1.10	1.15	
A01	A	20	0	5	NO	0.0	2	CP	00.00.47.127	00.00.50.650	3.93	4.22	0.06		0.79	0.84	
A02	A	20	0	8	NO	0.0	2	CP	00.01.23.688	00.01.27.442	6.97	7.29	0.06		1.39	1.46	
A03	A	50	0	4	NO	0.0	2	CP	00.00.46.381	00.00.50.146	3.87	4.18	0.06		0.77	0.84	
A04	A	40	0	3	NO	0.0	1	CP	00.00.28.834	00.00.31.901	4.81	5.32	0.05		0.48	0.53	
A05	A	40	0	3	NO	0.0	1	CP	00.00.31.428	00.00.34.805	5.24	5.80	0.06		0.52	0.58	
A06	A	40	0	3	NO	0.0	1	CP	00.00.28.925	00.00.31.950	4.82	5.33	0.05		0.48	0.53	
A07	A	20	0	6	NO	0.0	2	CP	00.01.00.813	00.01.04.382	5.07	5.37	0.06		1.01	1.07	
A08	A	20	0	11	NO	0.0	2	CP	00.01.58.746	00.02.02.376	9.90	10.20	0.06		1.98	2.04	
A09	A	50	0	5	NO	0.0	2	CP	00.00.50.375	00.00.53.840	4.20	4.49	0.06		0.84	0.90	
A1A	A	20	0	1	NO	0.0	2	CP	00.00.06.978	00.00.07.281	0.58	0.61	0.01		0.12	0.12	
A1B	A	20	0	3	NO	0.0	2	CP	00.00.29.719	00.00.31.647	2.48	2.64	0.03		0.50	0.53	
A11	A	20	0	5	NO	0.0	2	CP	00.00.47.579	00.00.50.893	3.97	4.24	0.06		0.79	0.85	
A12	A	20	0	6	NO	0.0	2	CP	00.01.02.018	00.01.05.440	5.17	5.45	0.06		1.03	1.09	
A14	A	20	0	2	NO	0.0	2	CP	00.00.18.758	00.00.19.750	1.56	1.65	0.02		0.31	0.33	
A17	A	40	0	0	NO	0.0	1	CP	00.00.00.875	00.00.00.879	0.15	0.15	0.00		0.01	0.01	
A18	A	40	0	0	NO	0.0	1	CP	00.00.00.241	00.00.00.242	0.04	0.04	0.00		0.00	0.00	
A19	A	20	10	0	NO	0.0	2	CP	00.00.00.885	00.00.00.896	0.07	0.07	0.00		0.01	0.01	
*PHYSICAL*										00.06.53.268		6.89		6.89			
TOTAL										00.14.25.725	00.22.09.784			7.74		14.43	22.17
A13	A	10					2	ICF	00.09.56.489	00.09.56.571	49.71	49.72	0.00		16.57	16.57	
A0D	A	10					1	ICF	00.09.57.867	00.09.57.902	99.66	99.66	0.00		16.61	16.61	
A0E	A	10					1	ICF	00.09.55.805	00.09.55.864	99.31	99.32	0.00		16.55	16.55	
A0F	A	10					1	ICF	00.09.32.715	00.09.33.044	95.46	95.52	0.01		15.91	15.92	
A1E	A	10					1	ICF	00.09.57.573	00.09.57.639	99.61	99.62	0.00		16.60	16.60	
A1F	A	10					1	ICF	00.09.57.899	00.09.57.934	99.66	99.67	0.00		16.61	16.61	
*PHYSICAL*										00.00.29.599		0.82		0.82			

# Workload Report

```

TRANSACTIONS      TRANS.-TIME  HHH.MM.SS.TTT  --DASD I/O--  ---SERVICE---  --SERVICE TIMES--  PAGE-IN RATES  ----STORAGE----
AVG      4.76  ACTUAL          92  SSCHRT  0.0  IOC      0  TCB      1405.2  SINGLE  0.0  AVG      0.00
MPL      4.76  EXECUTION      92  RESP   0.0  CPU     30714K  SRB      0.0  BLOCK  0.0  TOTAL  0.00
31029  QUEUED          0  CONN    0.0  MSO      0  RCT      0.0  SHARED  0.0  CENTRAL 0.00
END/S    51.73  R/S AFFINITY    0  DISC   0.0  SRB      0  IIT      0.0  HSP    0.0  EXPAND  0.00
#SWAPS   0      INELIGIBLE      0  Q+PEND 0.0  TOT     30714K  HST      0.0  HSP MISS 0.0
EXCTD    0      CONVERSION      0  IOSQ   0.0  /SEC   51208  IFA     1109.2  EXP SNGL 0.0  SHARED  0.00
AVG ENC  4.76  STD DEV        0
REM ENC  0.00
MS ENC   0.00
          ABSRPTN   11K  APPL% CP   49.3  EXP BLK  0.0
          TRX SERV  11K  APPL% IFACP 33.9  EXP SHR  0.0
          APPL% IFA  184.9

```

W O R K L O A D A C T I V I T Y

PAGE 3

z/OS V1R5

SYSPLEX SANDBOX  
 CONVERTED TO z/OS V1R5 RMF

DATE 07/28/2004  
 TIME 15.00.00

INTERVAL 09.59.979 MODE = GOAL

POLICY ACTIVATION DATE/TIME 07/27/2004 17.19.40

## Note

IFA = zAAP

## SMF Records

- The following SMF record types are extended in support of zAAPs.
  - SMF record 30
  - SMF record 70 subtype 1 (CPU activity)
  - SMF record 72 subtype 3 (Workload activity)
  - SMF record 79 subtype 1 and 2 (Address Space State and Resource data)



## SMF record 30

72	48	SMF30ENC	4	binary	CPU time used by the independent enclave, but only when in the WLM enclave. Note that independent enclave time on an IFA is not included. See field SMF30_ENCLAVE_TIME_ON_IFA for that value. SMF30ENC is also part of the value in SMF30CPT.														
76	4C	SMF30DET	4	binary	CPU time used by the dependent enclave, but only when in the WLM enclave. Note that dependent enclave time on an IFA is not included - see field SMF30_DEP_ENCLAVE_TIME_ON_IFA for that value. SMF30DET is also part of the value in SMF30CPT.														
80	50	SMF30CEP	4	binary	CPU time consumed for an address space or job while enqueue promoted (in 1.024 millisecond units).														
82	52	SMF30TF2	2	binary	Additional timer flags  <table border="1"> <thead> <tr> <th>Bit</th> <th>Meaning When Set</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>SMF30_TIME_ON_IFA has an invalid value due to a timer value calculation error.</td> </tr> <tr> <td>1</td> <td>SMF30_ENCLAVE_TIME_ON_IFA has an invalid value due to a timer value calculation error.</td> </tr> <tr> <td>2</td> <td>SMF30_DEP_ENCLAVE_TIME_ON_IFA has an invalid value due to a timer value calculation error.</td> </tr> <tr> <td>3</td> <td>SMF30_TIME_IFA_ON_CP has an invalid value due to a timer value calculation error.</td> </tr> <tr> <td>4</td> <td>SMF30_ENCLAVE_TIME_IFA_ON_CP has an invalid value due to a timer value calculation error.</td> </tr> <tr> <td>5</td> <td>SMF30_DEP_ENCLAVE_TIME_IFA_ON_CP has an invalid value due to a timer value calculation error.</td> </tr> </tbody> </table>	Bit	Meaning When Set	0	SMF30_TIME_ON_IFA has an invalid value due to a timer value calculation error.	1	SMF30_ENCLAVE_TIME_ON_IFA has an invalid value due to a timer value calculation error.	2	SMF30_DEP_ENCLAVE_TIME_ON_IFA has an invalid value due to a timer value calculation error.	3	SMF30_TIME_IFA_ON_CP has an invalid value due to a timer value calculation error.	4	SMF30_ENCLAVE_TIME_IFA_ON_CP has an invalid value due to a timer value calculation error.	5	SMF30_DEP_ENCLAVE_TIME_IFA_ON_CP has an invalid value due to a timer value calculation error.
Bit	Meaning When Set																		
0	SMF30_TIME_ON_IFA has an invalid value due to a timer value calculation error.																		
1	SMF30_ENCLAVE_TIME_ON_IFA has an invalid value due to a timer value calculation error.																		
2	SMF30_DEP_ENCLAVE_TIME_ON_IFA has an invalid value due to a timer value calculation error.																		
3	SMF30_TIME_IFA_ON_CP has an invalid value due to a timer value calculation error.																		
4	SMF30_ENCLAVE_TIME_IFA_ON_CP has an invalid value due to a timer value calculation error.																		
5	SMF30_DEP_ENCLAVE_TIME_IFA_ON_CP has an invalid value due to a timer value calculation error.																		
84	54	SMF30_TIME_ON_IFA	4	binary	CPU time spent on IFA in hundredths of a second (including enclave time).														
88	58	SMF30_ENCLAVE_TIME_ON_IFA	4	binary	Enclave time spent on IFA in hundredths of a second.														
92	5C	SMF30_DEP_ENCLAVE_TIME_ON_IFA	4	binary	Dependent enclave time spent on IFA in hundredths of a second.														
96	60	SMF30_TIME_IFA_ON_CP	4	binary	CPU time spent running IFA eligible work on a standard CP in hundredths of a second (including enclave time).														
100	64	SMF30_ENCLAVE_TIME_IFA_ON_CP	4	binary	IFA Enclave time spent on a standard CP in hundredths of a second.														
104	68	SMF30_DEP_ENCLAVE_TIME_IFA_ON_CP	4	binary	IFA Dependent enclave time spent on a standard CP in hundredths of a second.														

## SMF record 70 subtype 1 (CPU activity)

SMF record 70.1 CPU control section				
Offset	Name	Length	Format	Description
26 1A	SMF70IFA	2	Binary	IFA processors online at the end of the interval

SMF record 70.1 CPU data section					
Offset	Name	Length	Format	Description - CPU type	
15 0F	SMF70ITYP	1	Binary	0	Regular CP processor
				1	IFA (zAAP) processor

## SMF record 72 subtype 3 (Workload activity)

SMF record 72.3 workload manager control section					
Offset	Name	Length	Format	Description	
1 1	R723MFLG	1	Binary	Bit	Meaning when set
				0	Indicator for IFA cross-over
				1	Indicator for IFA honor priority
				2-7	Reserved
2 2		2		Reserved	

SMF record 72.3 workload manager control section					
540 F0	R723NFFI	4	Binary	Normalization factor for IFA time. Used to convert between real IFA times and the equivalent time on regular CP. Multiply normalized IFA times with 256 and divide it this value to calculate real IFA time	

## SMF record 72 subtype 3 (Workload activity)....

SMF record 72.3 period data section				
Offset	Name	Length	Format	Description
504 1F8	R723IFAU	4	Binary	IFA using samples
504 1FC	R723IFCU	4	Binary	IFA on CP using samples. If IFA honor-priority is set, these are included in R723CCUS. If not, these are included in R723IFAU.
512 200	R723IFAD	8	Binary	IFA delay samples
516 204	R723IFAT	8	Floating	Normalized IFA service time (microsecond) long floating point format. Multiply with 256 and divide by R723NFFI to calculate the real IFA service time.
524 20C	R723IFCT	8	Floating	IFA service time spent on CPs (microseconds)

## SMF record 79

SMF record 79.1 ASD and ASDJ data section				
Offset	Name	Length	Format	Description
192 C0	R791TIFA	4	Binary	IFA service time (milliseconds) assb_time_on_ifa
196 C4	R791TCP	4	Binary	Service time spent on CPs (milliseconds) assb_time_on_cp
200 C8	R791TIFC	4	Binary	IFA service time spent on CPs (milliseconds) assb_time_ifa_on_cp

# Capacity Planning

## Are zAAPs right for my workloads?

- ❑ **zAAP Projection Tool for Java 2 Technology Edition**
  - *Instrumented SDK 1.3.1, available through the Web*
  - *Instrumentation included in SDK 1.4*
- ❑ **Capacity Planning Considerations for zAAP**
  - *White Paper - describes the zAAP Projection Tool, prototype measurements and Capacity Planning methodology*
- ❑ **Size 390**
  - *Updated tool available*
  - *Special assistance for the sizing methodology described in the white paper. Support also provided with sizing consolidation of distributed Java workloads onto zSeries and zAAP(s)*

# Projection Tool for Java 2 Technology Edition

- ❑ **SDK 1.3.1 – as is**
  - The zAAP Projection Tool for Java 2 Technology Edition, SDK1.3.1 users, is an instrumented version of Java for OS/390, Java 2 Technology Edition PTF UQ84703 (SR 22)
  - Excel worksheet
- ❑ **SDK 1.4**
  - The added function in the Projection tool is an officially supported part of the z/OS SDK1.4 product, IBM SDK for z/OS, Java 2 Technology Edition, product 5655-I56, with service PTF UQ88783 or later
  - The EXCEL worksheet can be used, as-is, in conjunction with the SDK1.4
- ❑ **z/OS 1.6 and SDK 1.4**
  - RMF reports, spreadsheets
  - SMF and reduction programs



## zAAP Projection Tool for Java 2

<i>Subsystem</i>	<i>zAAP Projection Tool for Java 2 Technology Edition, SDK V1.3.1</i>	<i>IBM SDK for z/OS, Java 2 Technology Edition, SDK V1.4</i>
WebSphere Application Server V5.02	Yes	
WebSphere Application Server V5.1		Yes
IMS V7.1	Yes	Yes
IMS V8.1	Yes	Yes
IMS V9.1		Yes
CICS TS V2.2	Yes	
CICS TS V2.3		Yes
DB2 V7.1	Yes	Yes
DB2 V8.1	Yes	Yes

# Projection Tool for Java 2 Technology Edition

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IBM eServer

## zSeries Application Assist Processor (zAAP)

Delivering a specialized z/OS Java execution environment

Get started | Prerequisites | Ordering | Configuration

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The zAAP Projection Tool for Java 2 Technology Edition, SDK 1.3.1, along with an accompanying Excel Workbook tool for reading, organizing and analyzing data, will allow customers who are considering zAAPs to learn the potential for Java execution on zAAPs inherent in their existing applications. This tool will gather usage information about how much CPU time is spent executing Java code which could potentially execute on zAAPs. By running a Java workload that is representative of the production system operations, it will report, via the Java log, how much of that workload could be eligible for execution on zAAPs. This information will also be useful in predicting the number of zAAPs that might be necessary in order to provide an optimum zAAP configuration.

In conjunction with the tools mentioned above, an IBM White Paper is also available describing the work that was done in preparation for the introduction of the zAAP Projection Tool and describes the workloads tested as well as the results attained. In addition, the paper defines the methodology customers should follow to do the proper capacity planning. For example, it describes running the IBM SDK tool and how to use the results to determine the number of zAAPs required in a particular environment.

To download White Paper, visit:  
[ibm.com/support/techdocs/atmstr.nsf/WebIndex/WP100417](http://ibm.com/support/techdocs/atmstr.nsf/WebIndex/WP100417)

To download the Tools, visit:  
<http://www6.software.ibm.com/dl/zosjava2/zosjava2-p>

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**zAAP Home Page [ibm.com/servers/eserver/zseries/zaap](http://ibm.com/servers/eserver/zseries/zaap)**

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---

z/OS Java 2 Technology Edition Projection Tool for z/OS & OS/390, z/OS.e

Read me: sdk131projectiontoolreadme.txt 6K	<a href="#">Download now</a>
Projection tool: sdk131projectiontool.PAX.Z 46MB	<a href="#">Download now</a>
Projection tool workbook: zAAP_projection_tool_workbook.xls 1384K	<a href="#">Download now</a>

Languages Included: English US

### Installation and Usage Information

Before using the tool, please be sure to obtain the white paper from <http://www.ibm.com/support/techdocs/atsmastr.nsf/WebIndex/WP100417>

ReadMe file, 5K  
PAX.Z file, 46MB  
Excel workbook, 1.3MB

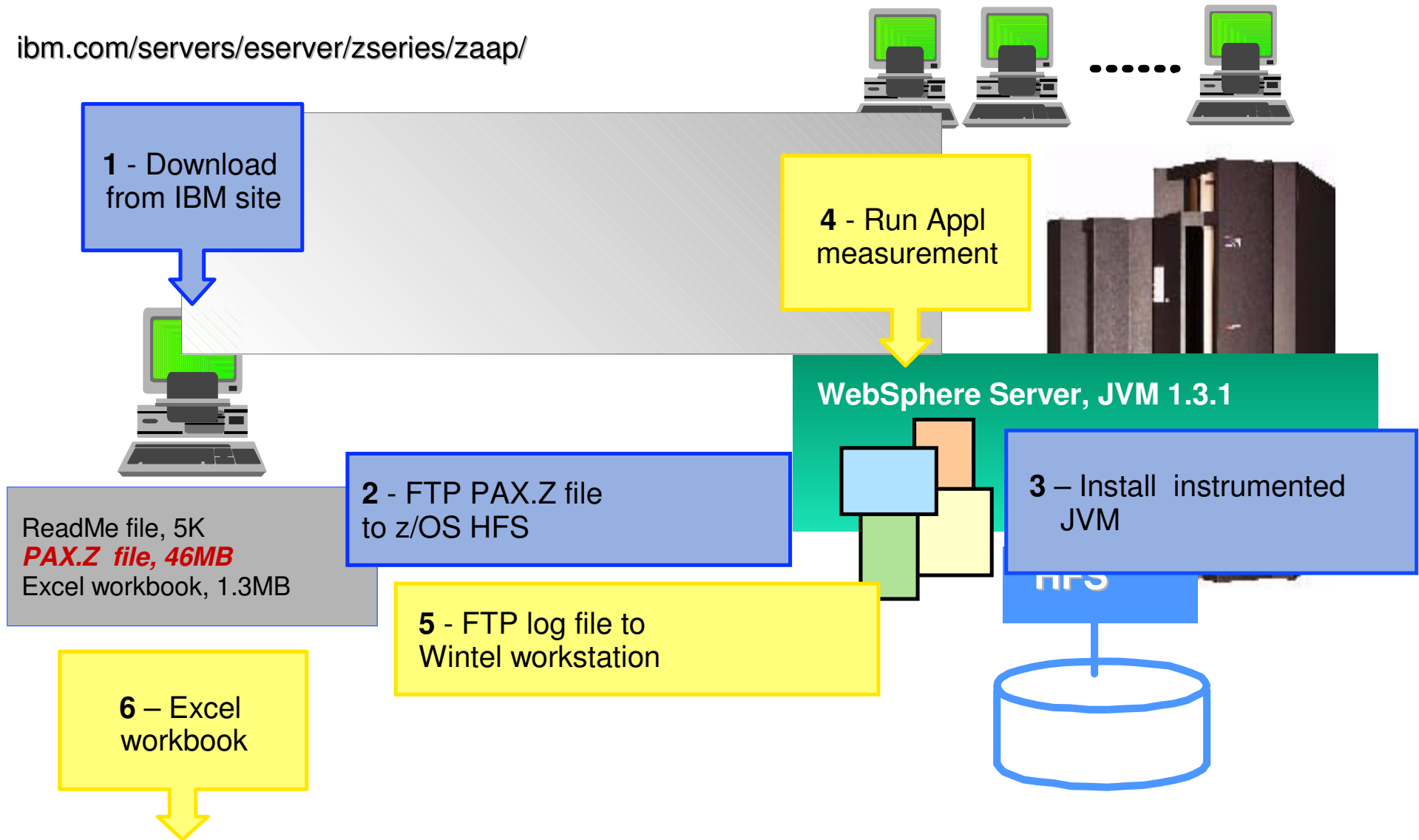
# Projection Tool for Java 2 Technology Edition, SDK 1.3.1

- You must apply the fixes for the following APARs
  - PQ40047
  - PQ40048
  - OW45508
  - OW45580
  - OW48160
  - PQ37095
  - PQ39287
- Check the following APARs
  - PQ26125
  - PQ26525
  - PQ36944
  - PQ39622
  - PQ39940
  - PQ40027
  - OW47432
  - OW54362 or OW55013
  - PQ60748

Check the Readme.txt file for the latest maintenance information

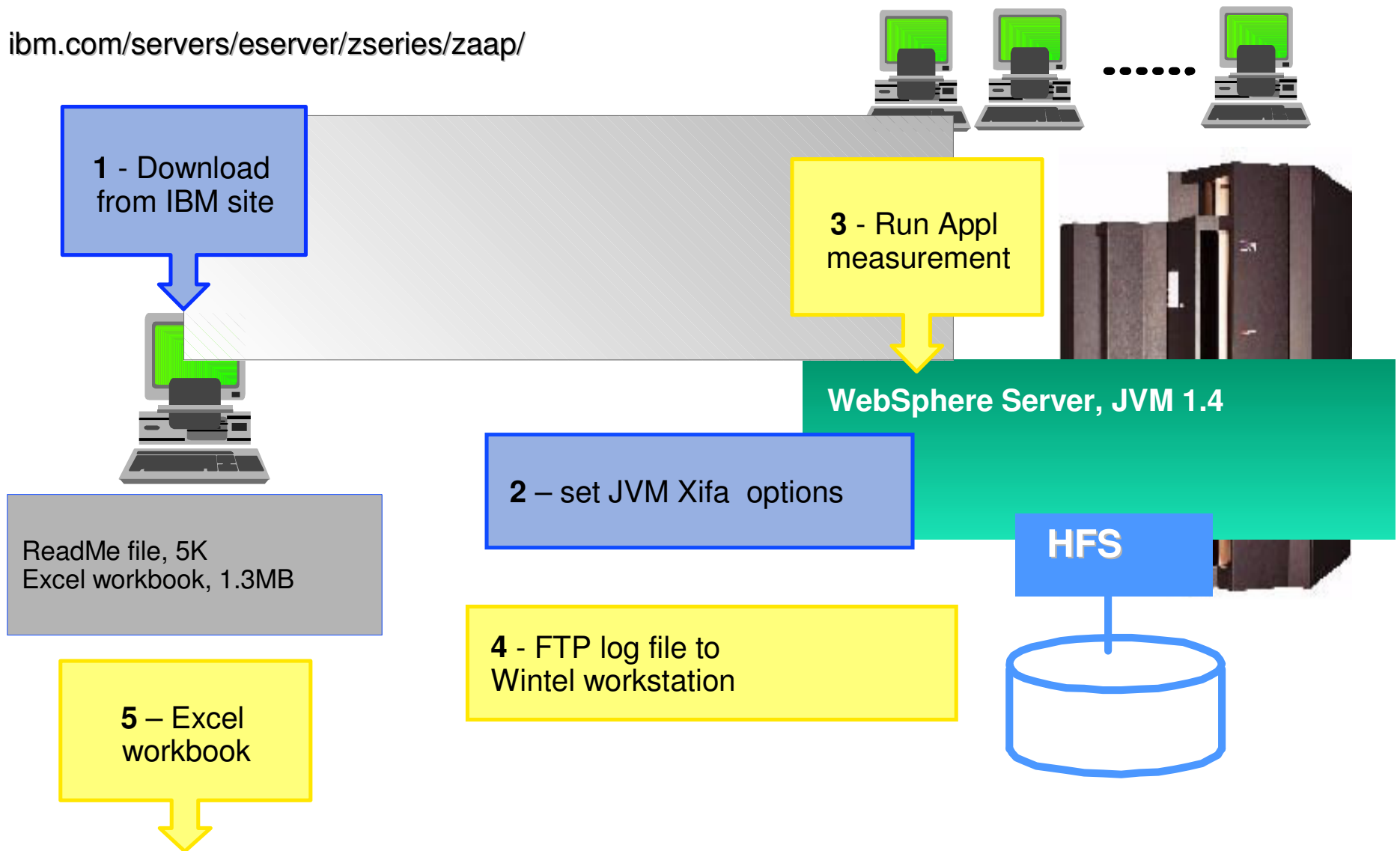
# zAAP Projection Tool – Java SDK 1.3.1

[ibm.com/servers/eserver/zseries/zaap/](http://ibm.com/servers/eserver/zseries/zaap/)



# zAAP Projection Tool – Java SDK 1.4

[ibm.com/servers/eserver/zseries/zaap/](http://ibm.com/servers/eserver/zseries/zaap/)



# Excel Workbook

The screenshot shows the Microsoft Excel interface with the 'Add-Ins' dialog box open. The dialog box lists the following add-ins available:

- Analysis ToolPak
- Analysis ToolPak - VBA
- Conditional Sum Wizard
- Euro Currency Tools
- Internet Assistant VBA
- Lookup Wizard
- Solver Add-in

The background Excel window shows a workbook titled 'zAAP java projection tool workbook - requires macros enabled at...'. The worksheet contains the following text and table:

zAAP java projection tool workbook - requires macros enabled at...

Analysis ToolPak installed

Enter a name to be associated with the address space for which you have also optionally enter the instance or group which will allow you to view the synchronization value (if applicable). These values may be changed on the character in the names you choose. Push the "Obtain projection data" button

Data collected	Webshpere instance	Address Space Name	Service Class
		FMI	(optional)
Obtain projection data from file			
Address spaces processed	Service Class	N   LO	processed

A yellow callout box on the left contains the text: "Load data from file".

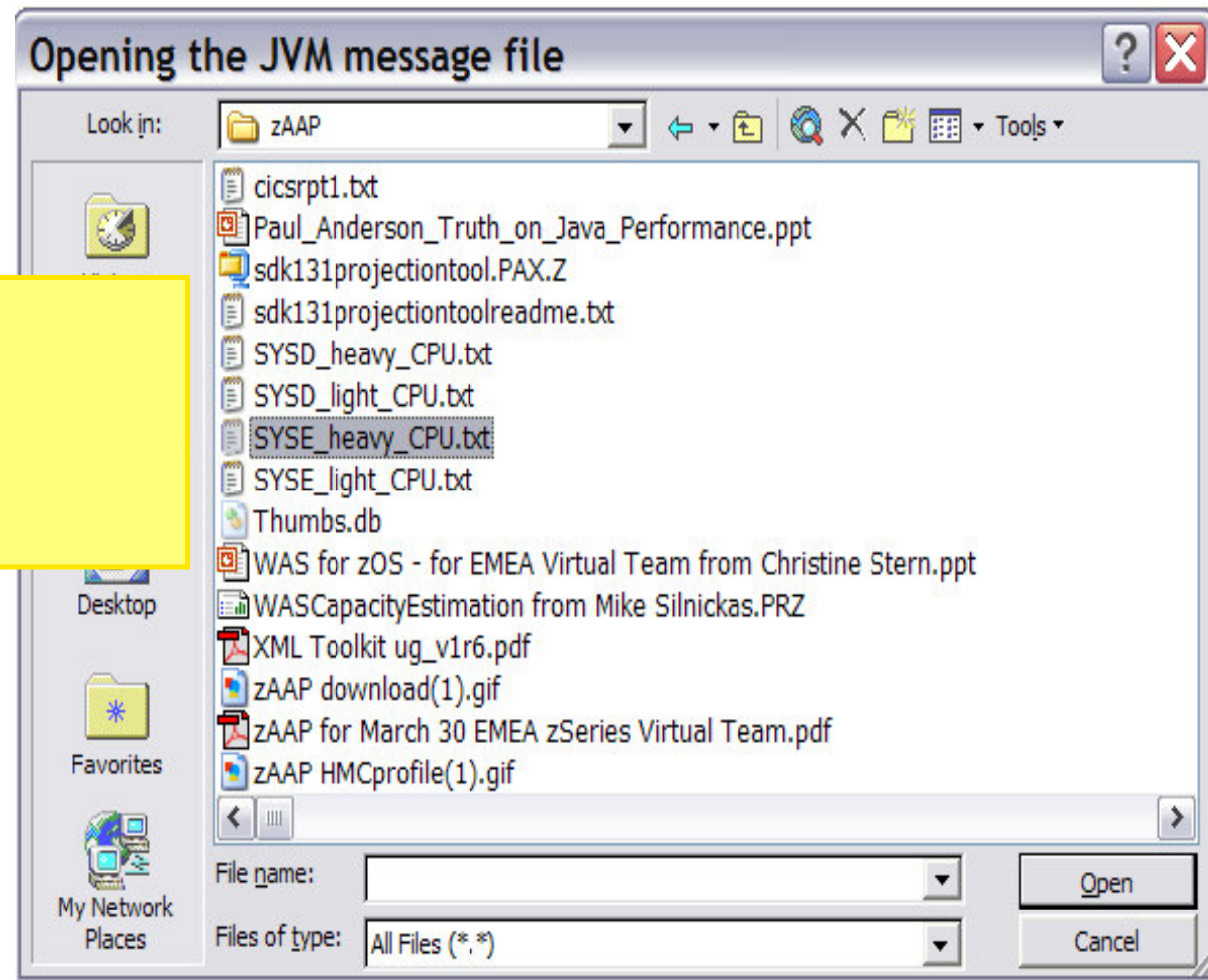
Required Addin: Select **Tools** then **Add-Ins**  
 Check **Analysis Toolpak** and **Analysis Toolpak - VBA**  
 and then click Ok.

# Obtain projection data from file

select

Obtain projection data from file

Select JVM  
Message File  
(FTPed from z/OS)





# Excel Summary report

	AA	AB	AC	AD	AE	AF	AH	AI	AJ	AK	AL	AM
1	smf_name	Instance or Group	Interval start	zAAP eligible seconds	Java not eligible seconds	Space CPU seconds	%Time zAAP eligible	zAAP% engine eligible	Other Java% engine	Appl% engine	zAAP% w/capt ratio	Uplift for expected util
	<a href="#">Go to Inventors</a>											
2	z900		Service Class		ALL_SC		Group in Service Class			90%	80%	
3	SYSE		23:29:00	51	52	134	38%	6%	6%	15%	6%	8%
4	SYSE		23:44:00	48	50	128	38%	5%	6%	14%	6%	7%
5	SYSE		23:59:00	49	51	130	38%	5%	6%	14%	6%	8%
6	SYSE		00:14:00	50	51	132	38%	6%	6%	15%	6%	8%
7	SYSE		00:29:00	51	52	135	38%	6%	6%	15%	6%	8%
8	SYSE		00:44:00	49	51	131	38%	5%	6%	15%	6%	8%
9	SYSE		00:59:00	51	53	135	38%	6%	6%	15%	6%	8%
10	SYSE		01:14:00	53	55	141	38%	6%	6%	16%	7%	8%
11	SYSE		01:29:00	50	52	132	38%	6%	6%	15%	6%	8%
12	SYSE		01:44:00	52	53	137	38%	6%	6%	15%	6%	8%
13	SYSE		01:59:00	54	56	143	38%	6%	6%	16%	7%	8%
14	SYSE		02:14:00	52	53	136	38%	6%	6%	15%	6%	8%
15	SYSE		02:29:00	52	54	139	38%	6%	6%	15%	6%	8%
16	SYSE		02:44:00	53	55	141	38%	6%	6%	16%	7%	8%
17	SYSE		02:59:00	54	56	143	38%	6%	6%	16%	7%	8%
18	SYSE		03:14:00	53	54	139	38%	6%	6%	15%	6%	8%
19	SYSE		03:29:00	54	56	144	38%	6%	6%	16%	7%	8%
20	SYSE		03:44:00	57	59	150	38%	6%	7%	17%	7%	9%
21	SYSE		03:59:00	53	55	141	38%	6%	6%	16%	7%	8%
22	SYSE		04:14:00	17	18	46	38%	6%	6%	15%	6%	8%

Summary-z900\_ALL\_SC / Inventory / SYSE-z900\_FMI /

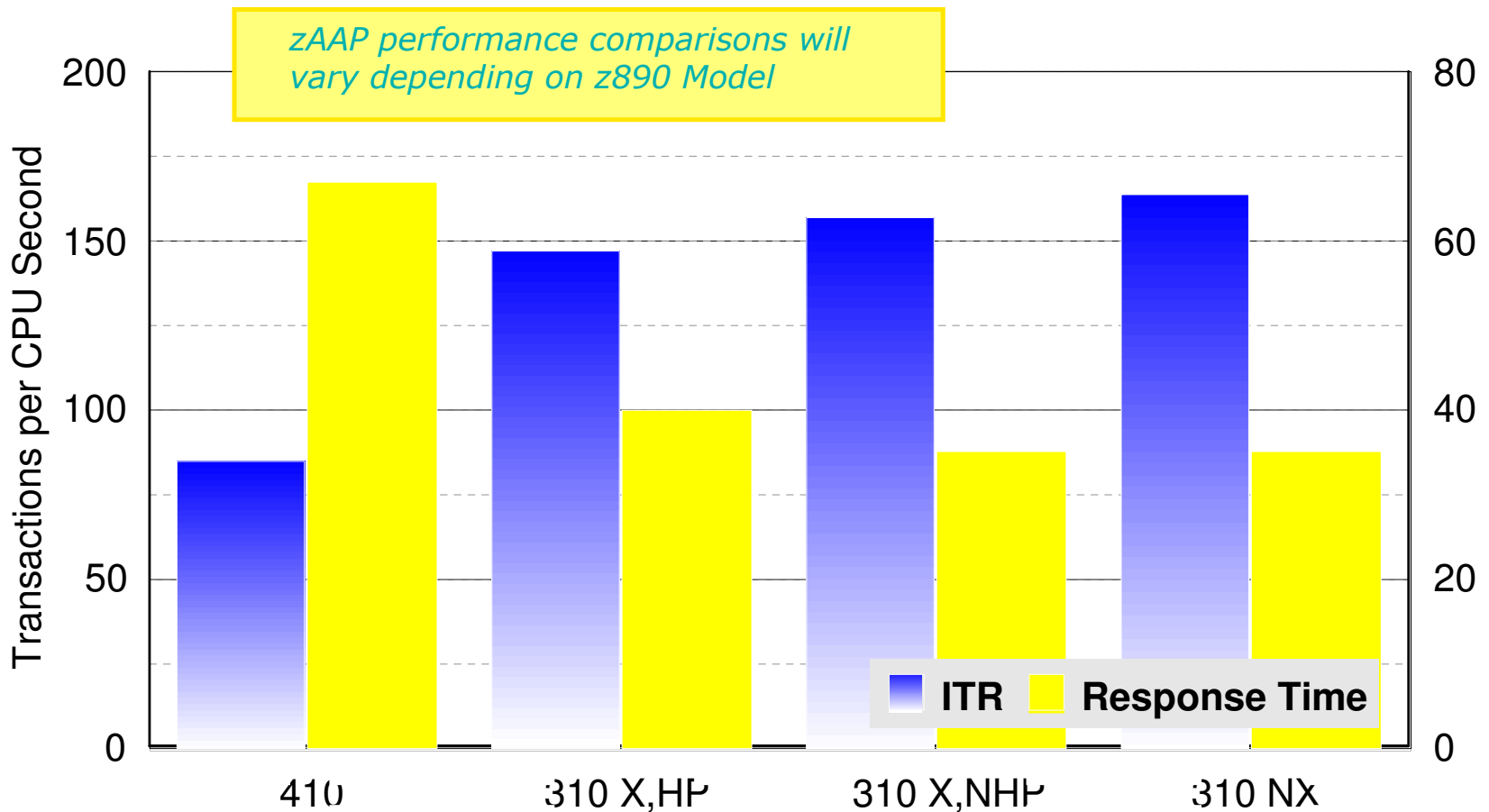
Ready

# Hints (*ROT*s)

Workload	Notes	zAAP %
XML parser	Parsing of XML documents, using either SAX or DOM parsing APIs with and without validity checking.	98%+
Trade2	JSP, servlets, stateless EJB. Light SQL with a small data base component.	40%
Trade3 ++	Evolved from Trade 2 - J2EE 1.3 with EJB 2.0 component architecture, MDB with Pub/Sub and point-to-point asynchronous messaging. Light SQL with a small data base component.	60%
Web enabled CICS or IMS (ERWW)	Web-Enabled access to traditional CICS, IMS systems and DB2 data bases. J2EE application using servlets, JSPs, stateless session EJBs and access to legacy CICS/IMS. All the business logic is in the legacy transaction	40%
Legacy CICS/IMS	All the business logic in the legacy transaction, no Java	0%

# Performance Considerations

# z890 – Model 410 vs Model 310+zAAP



- Engine speed ratio = 13.8x
- zAAP 15 - 20% CPU busy
- Standard CPs running approx. 90% CPU busy

zAAP runs at Model 170 engine speed



IBM Systems Group

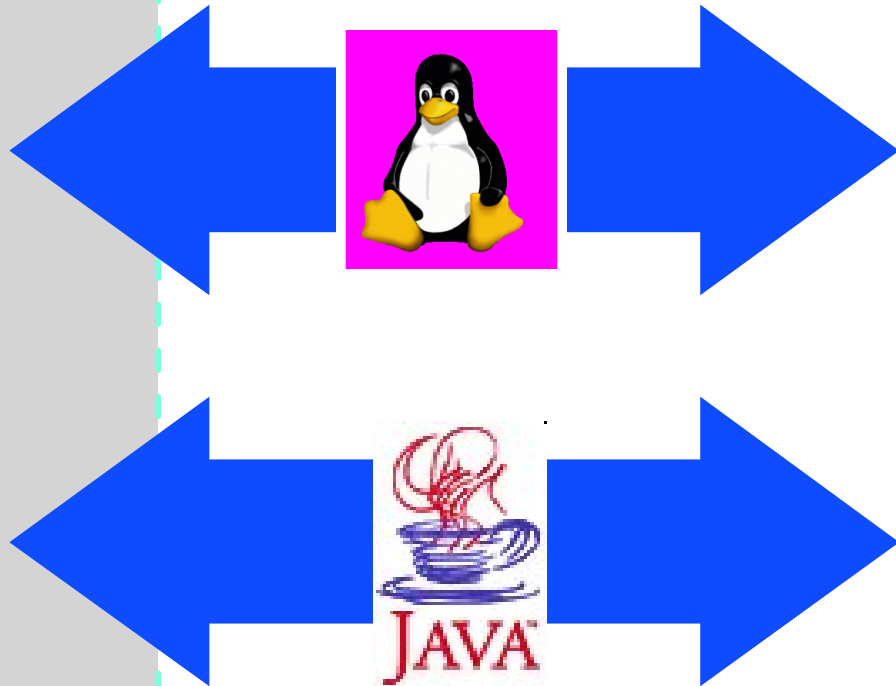
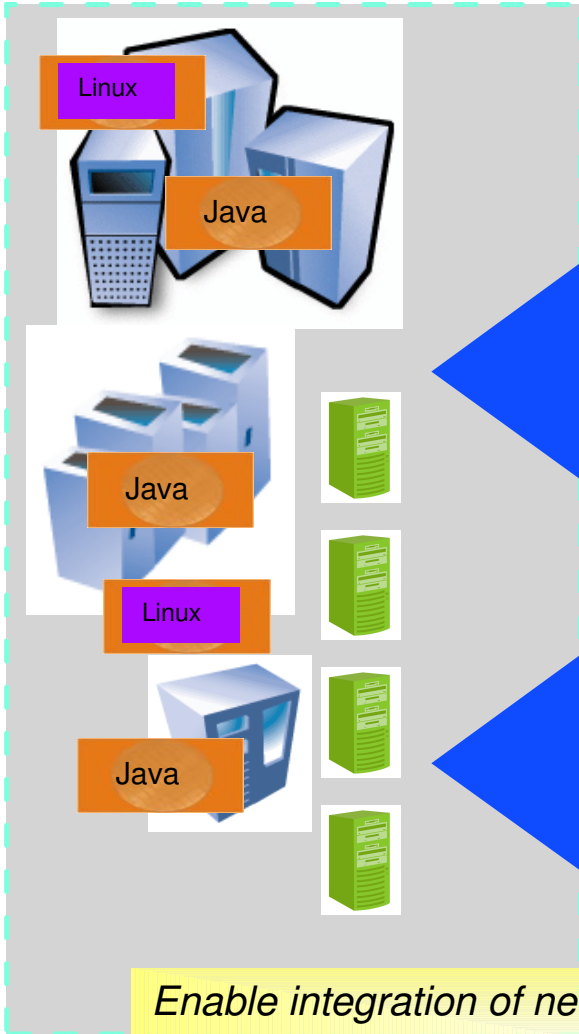
# zAAP Summary

## zAAP Summary

- ❑ **Business Integration model**
  - New strategic Java technology-based applications
  - Require additional CPU resources
- ❑ **zAAPs for business integration and infrastructure Simplification**
  - Integrate new applications with mission-critical data
  - Help reduce infrastructure complexity for multi-tier applications
- ❑ **zAAP ...an industry first**
  - Only specialized processing units for Java Code today
  - Supported by IBM Middleware such as WebSphere, DB2...
- ❑ **zAAPs Provide Investment Flexibility**
  - Extend the value of existing zSeries investments
  - Reduced Total Cost of Ownership through software and maintenance savings

# From n-tier to physical 2-tier

*High performance, reliability, availability, security, and lower total cost of ownership*



*Enable integration of new Java based Web applications with core z/OS backend database environment*

**WebSphere** software

## The next steps

- ❑ Establish z/OS 1.6 migration plan
  - *Subsystems – WebSphere, CICS TS, DB2, etc.*
- ❑ IBM SDK for z/OS, Java 2 Technology Edition V1.4
  - *WebSphere Server, or Server Foundation V5.1 migration plan*
- ❑ Capacity Planning
  - *Review LSPR document, zAAP Capacity Planning White Paper*
  - *Run zAAP projection tool or use ROTs*
- ❑ IBM z990 or z890 server zAAP upgrade
  - *Configuration planning, Partition definition*
- ❑ Leverage zSeries Web-enablement Workshops
  - *WebSphere on z/OS infrastructure skills*





## For more information...

- ❑ zSeries Web site
  - *[ibm.com/zSeries](http://ibm.com/zSeries)*
- ❑ zAAP Web site
  - *[ibm.com/zseries/zaap](http://ibm.com/zseries/zaap)*
- ❑ z/OS Migration site
  - *[ibm.com/zseries/zos](http://ibm.com/zseries/zos)*

Obrigado !!!!

