zSeries Explorers

ZAAP

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Brasília 27/10/04

natalino@br.ibm.com


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

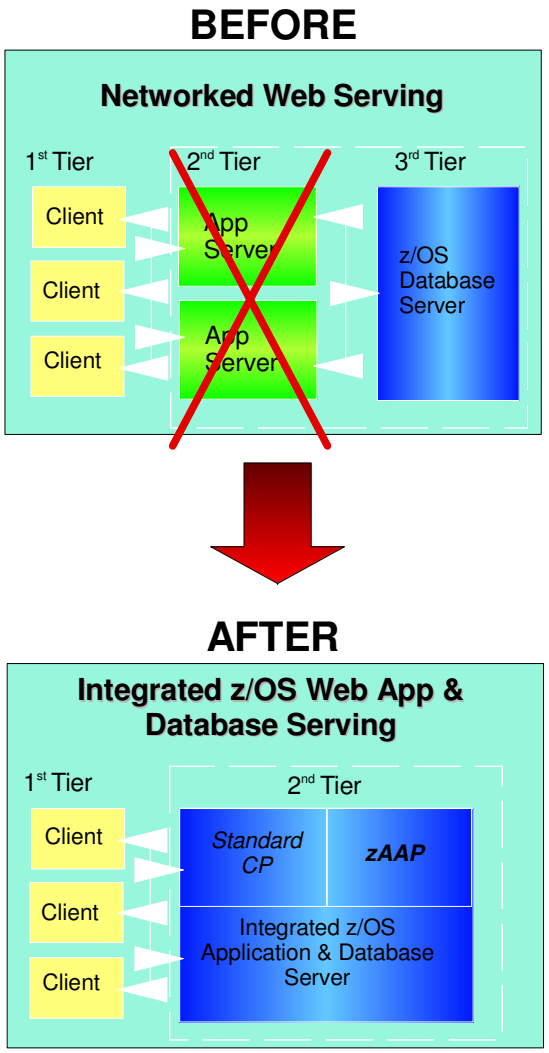
- **Sources for zAAP information**
  - The main page for the zAAP can be found at:
    - http://www-1.ibm.com/servers/eserver/zseries/zaap/gettingstarted/
  - The white paper can be reached at:
    - http://www-1.ibm.com/support/techdocs/atsmastr.nsf/WebIndex/WP100417
  - The tools supporting the announcement can be dowloaded 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



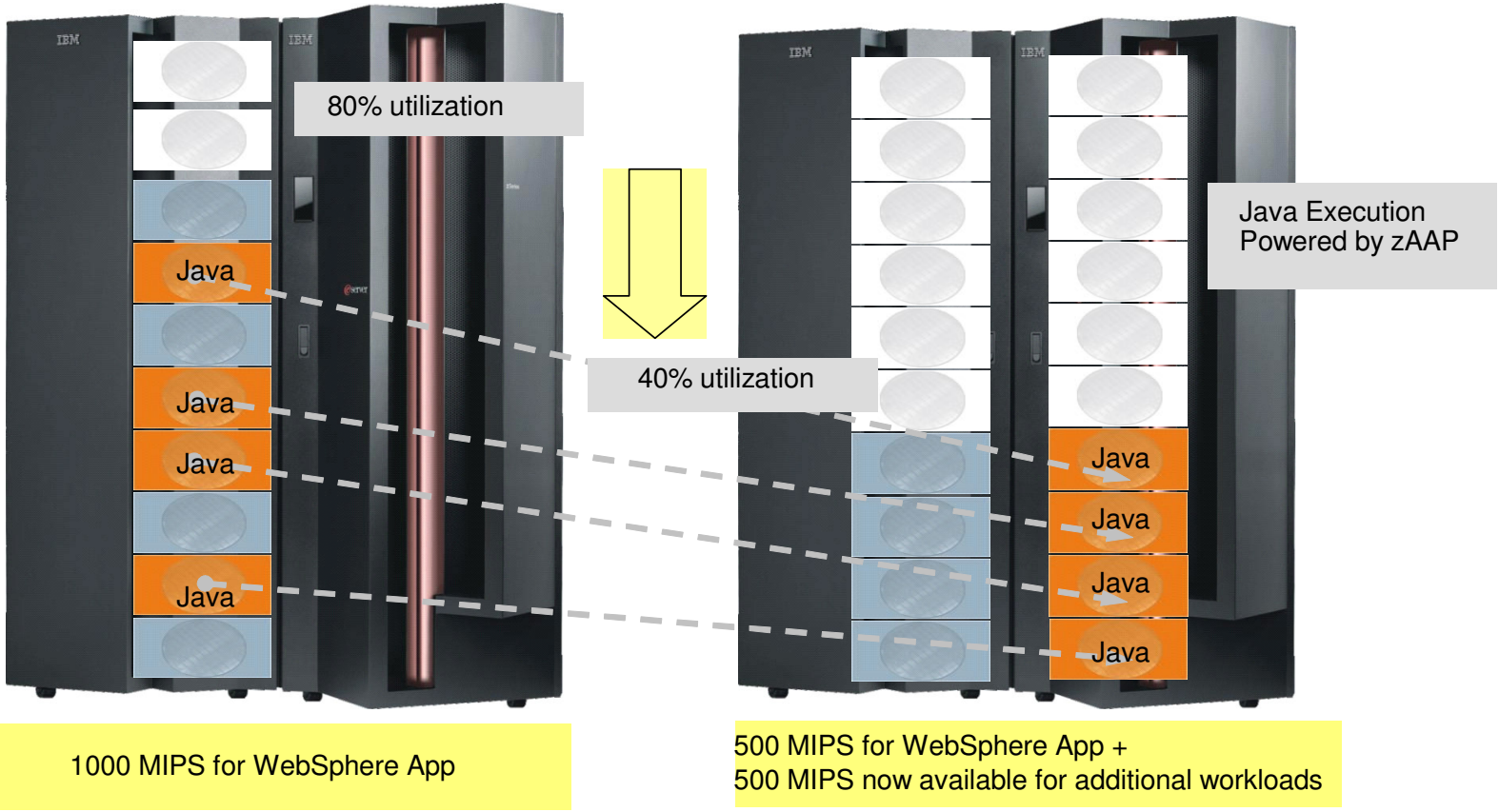
The new zSeries Application Assist Processor (zAAP)

- 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…

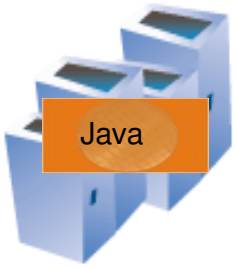
Consider a WebSphere Application that is transactional in nature and requires 1000 MIPS today on zSeries.



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…



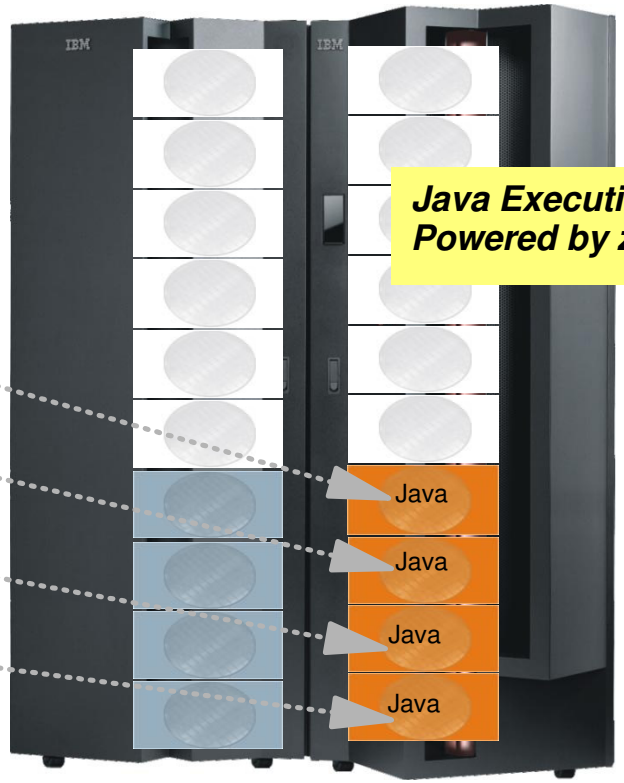
Enterprise Systems Management

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

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

An economical Java execution environment

WebSphere software



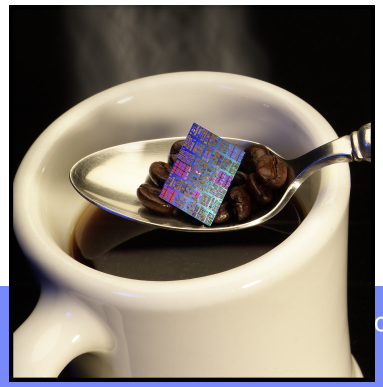
Java Execution Powered by zAAP

z/OS

Technical Overview

zAAP Operational controls

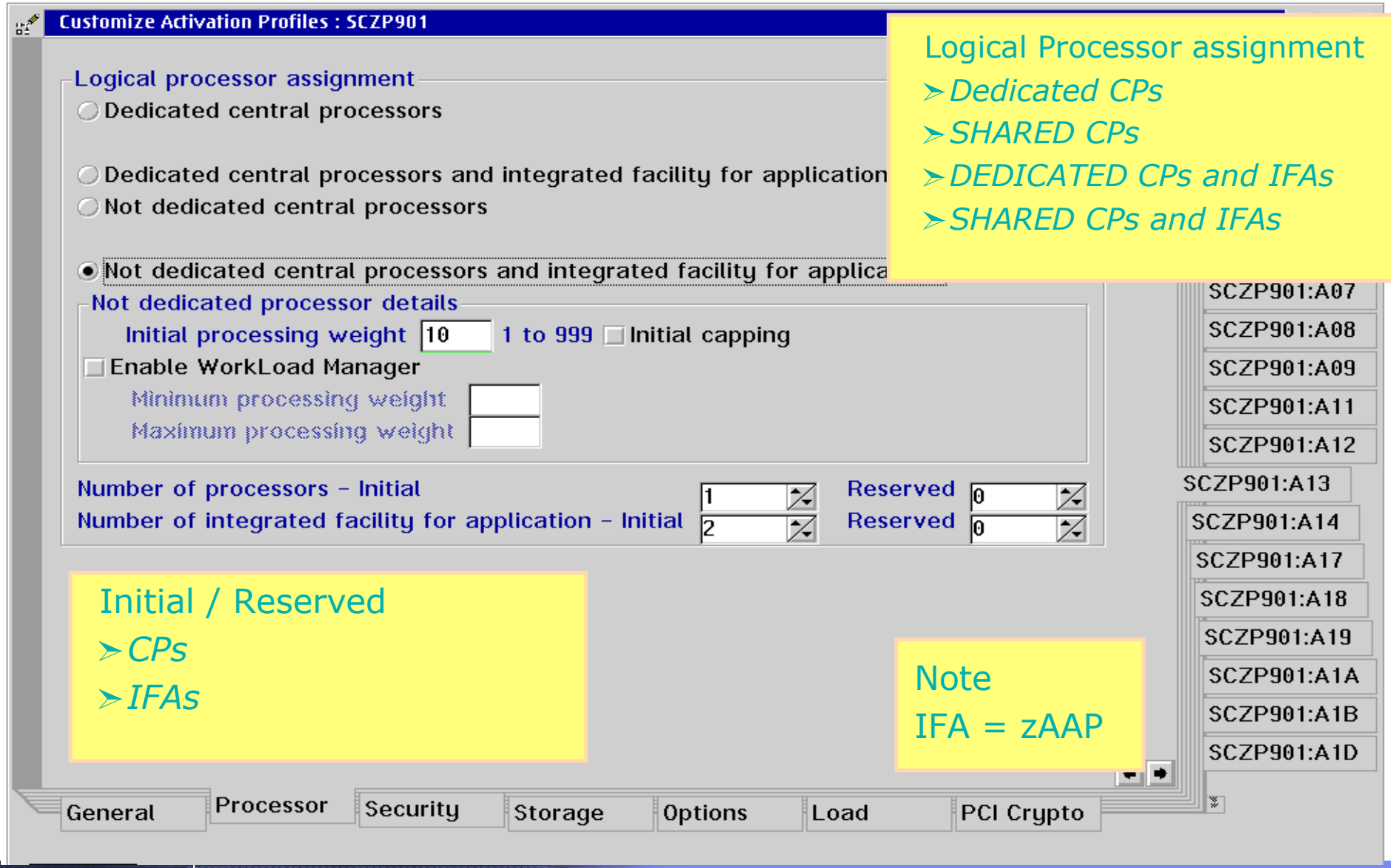
- IBM z990 or z890 server LPAR Configuration
  - Logical Partition Image profile - Processors
  - LPAR Controls – Processing Weights
- z/OS 1.6 Dispatcher options
  - PARMLIB member IEAOPTxx
  - IFAHONOR_PRIORITY = Yes/No
  - IFACrossover = Yes/No
- JVM runtime options
  - -Xifa: on, off, force, projectn



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



Logical Processor assignment
- *Dedicated CPs*
- *SHARED CPs*
- *DEDICATED CPs and IFAs*
- *SHARED CPs and IFAs*

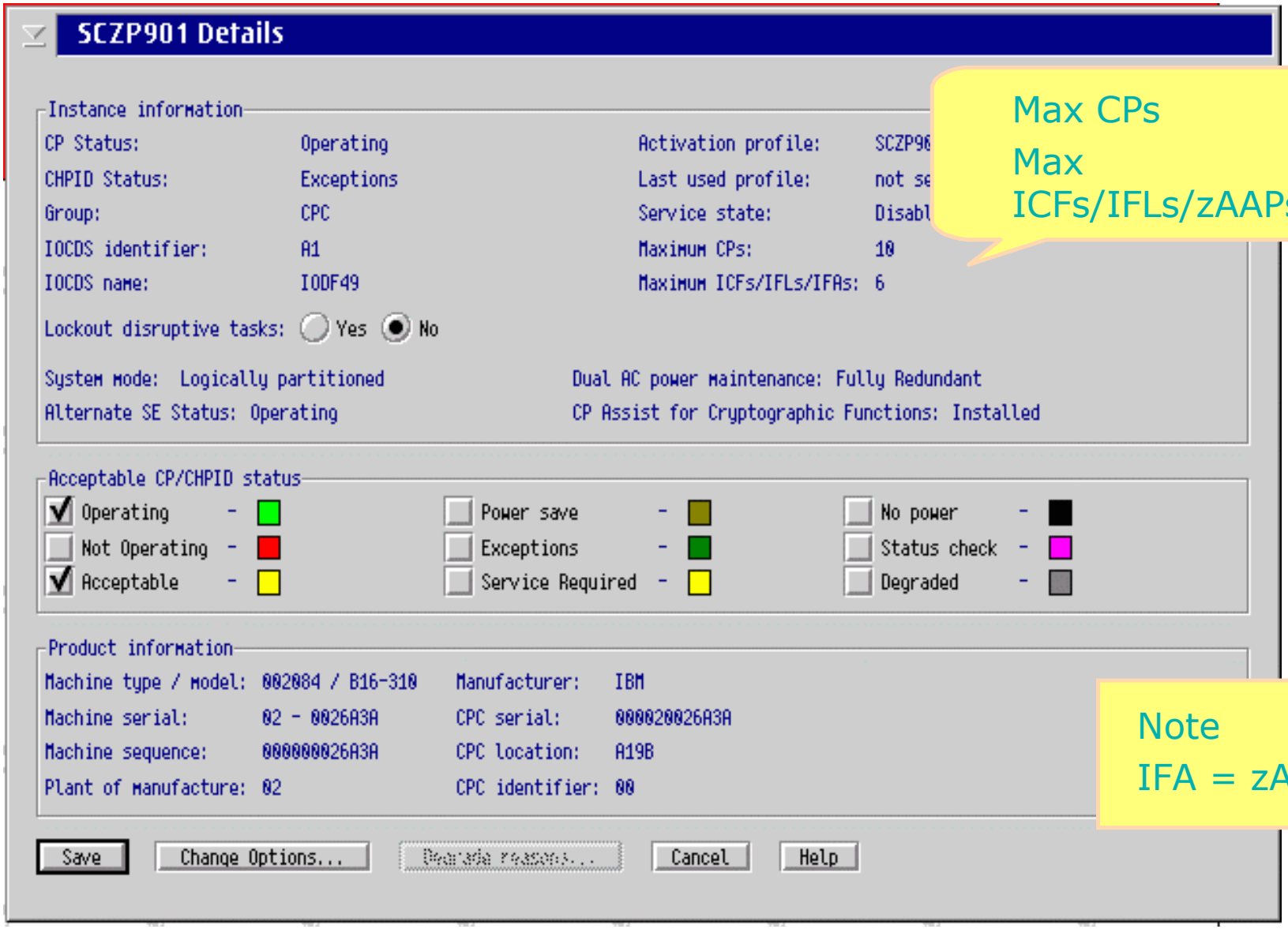
Initial / Reserved
- *CPs*
- *IFAs*

Note
IFA = zAAP

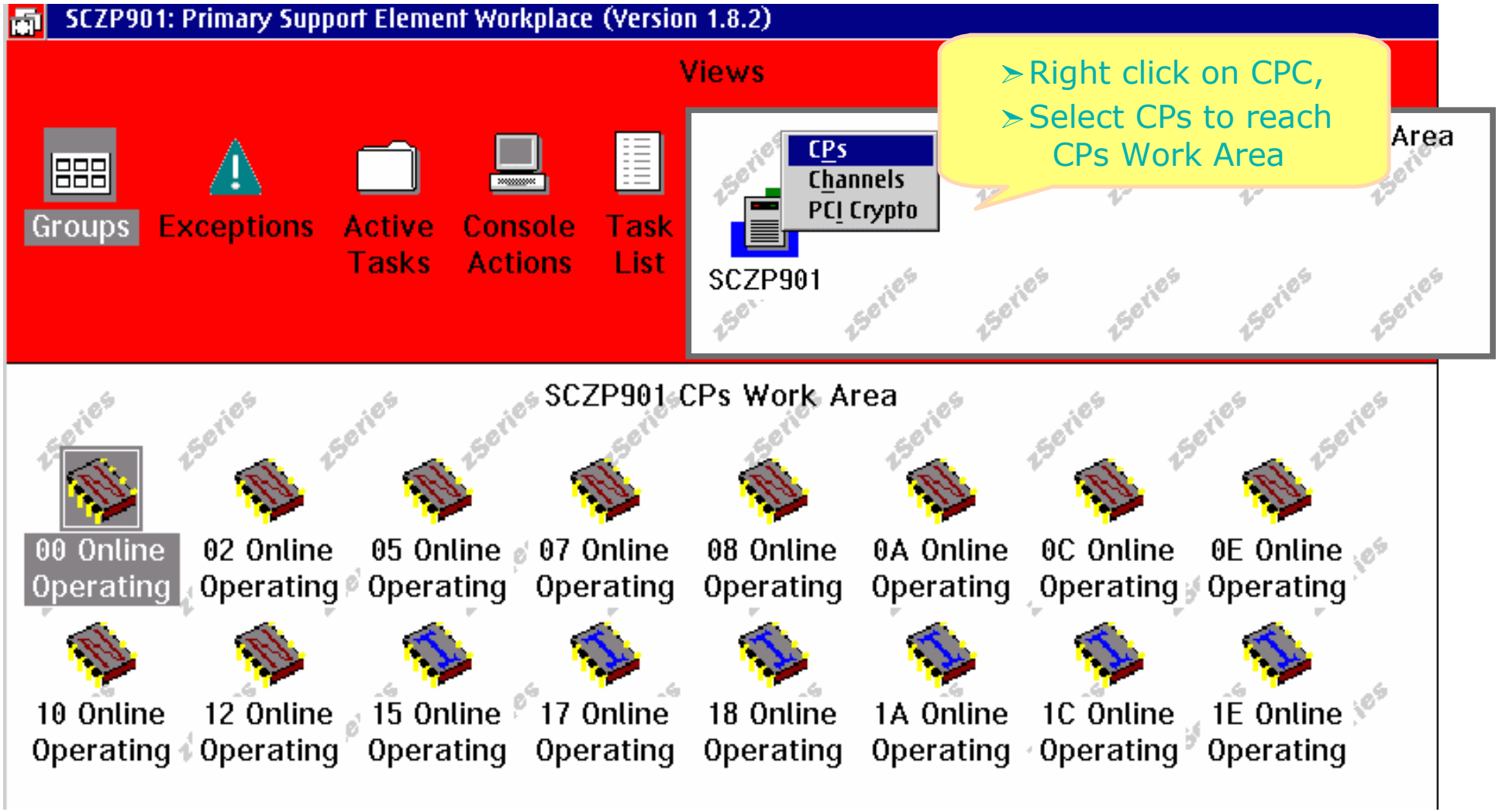
zAAP characteristics

- zAAPs
  - *Cannot be IPLed*
  - *Only executes z/Architecture™ mode instructions*
  - *Do not support manual operator controls*
    - *No PSW Restart, LOAD or LOAD derivates*
  - *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

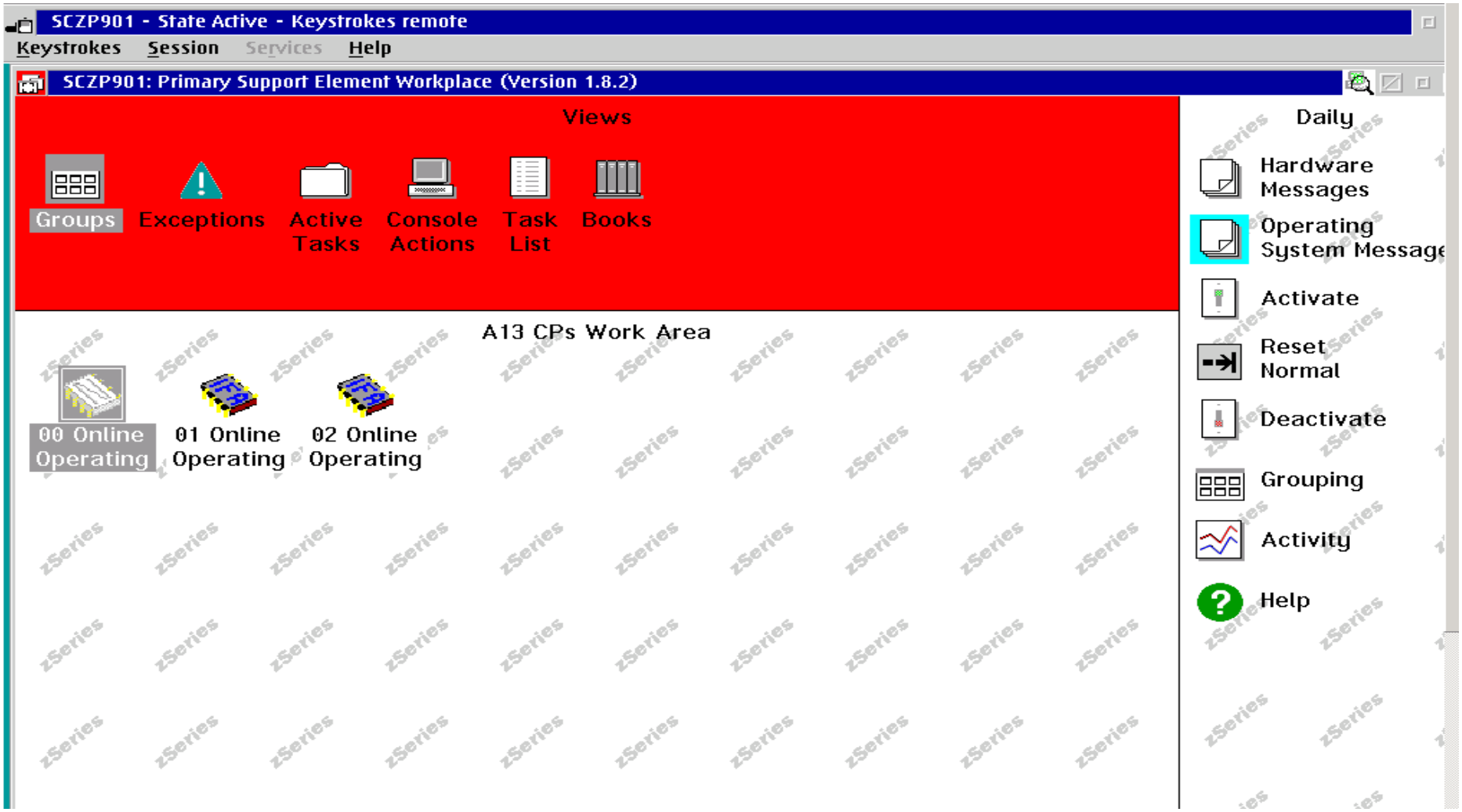


SE CPC Work Area



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

Image CPs Work Area



Z990 HMC – LPAR Controls

Only two *NON-DEDICATED* Pools
- CPs
- ICFs Pool contains ICFs, IFLs and IFAs (zAAPs)

A3 IODF47

WLM Managed	Initial Processing Weight	Minimum Processing Weight	Maximum Processing Weight	Initial Capping	Current Capping	Non-dedicated Central Processors	Integrated Coupling Facility Processors	Logical Partition
☐	50	0	0	☐	No	3	0	A0A
☐	10	0	0	☐	No	2	0	A0B
☐	20	0	0	☐	No	2	0	A0C
☐	10	0	0	☐	No	0	1	A0D
☐	10	0	0	☐	No	0	1	A0E
☐	10	0	0	☐	No	0	1	A0F
☐	20	0	0	☐	No	1	0	A01
☐	20	0	0	☐	No	2	0	A02
☐	50	0	0	☐	No			
☐	40	0	0	☐	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

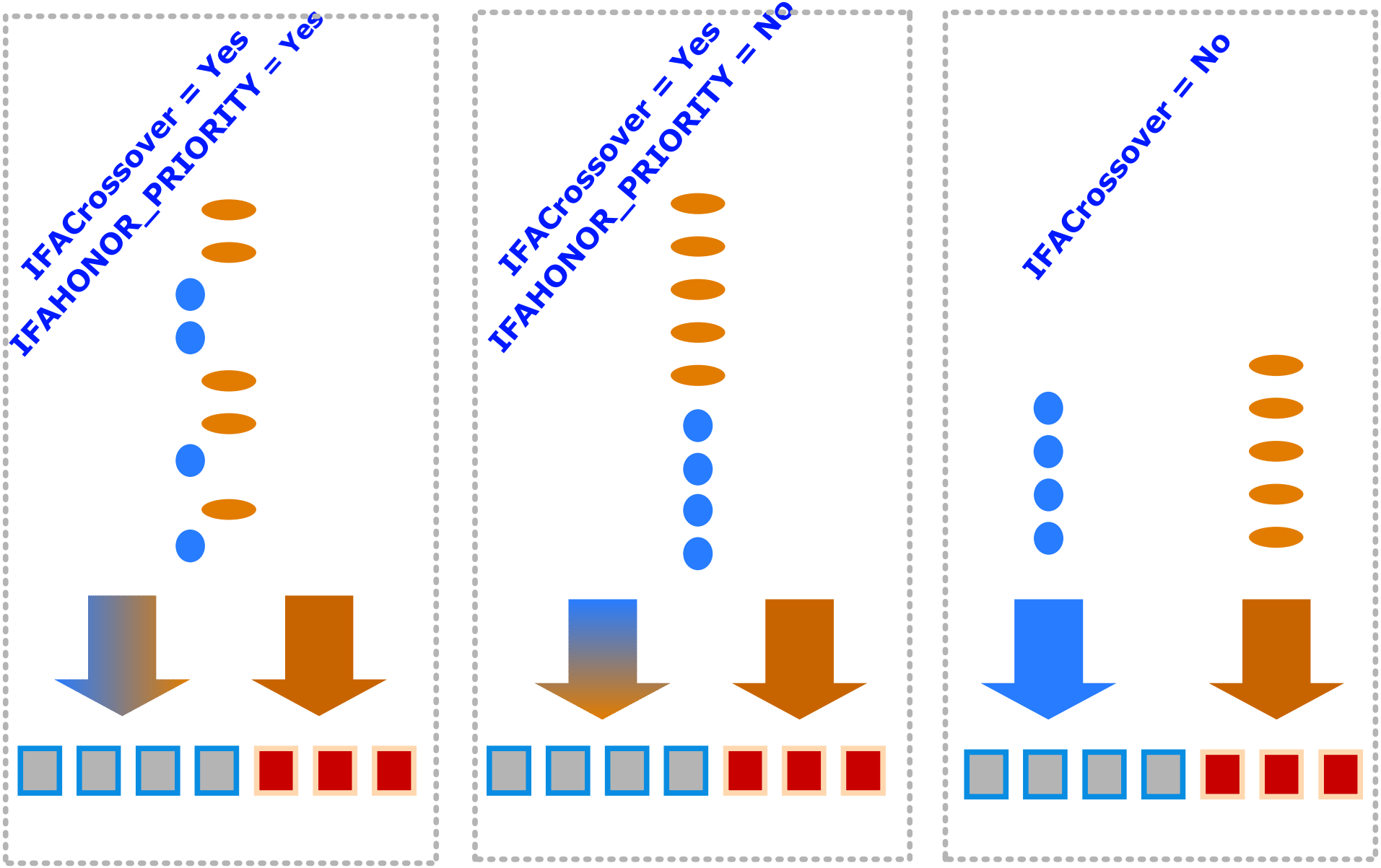
Java Crossover - IFACrossover = Yes

- 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



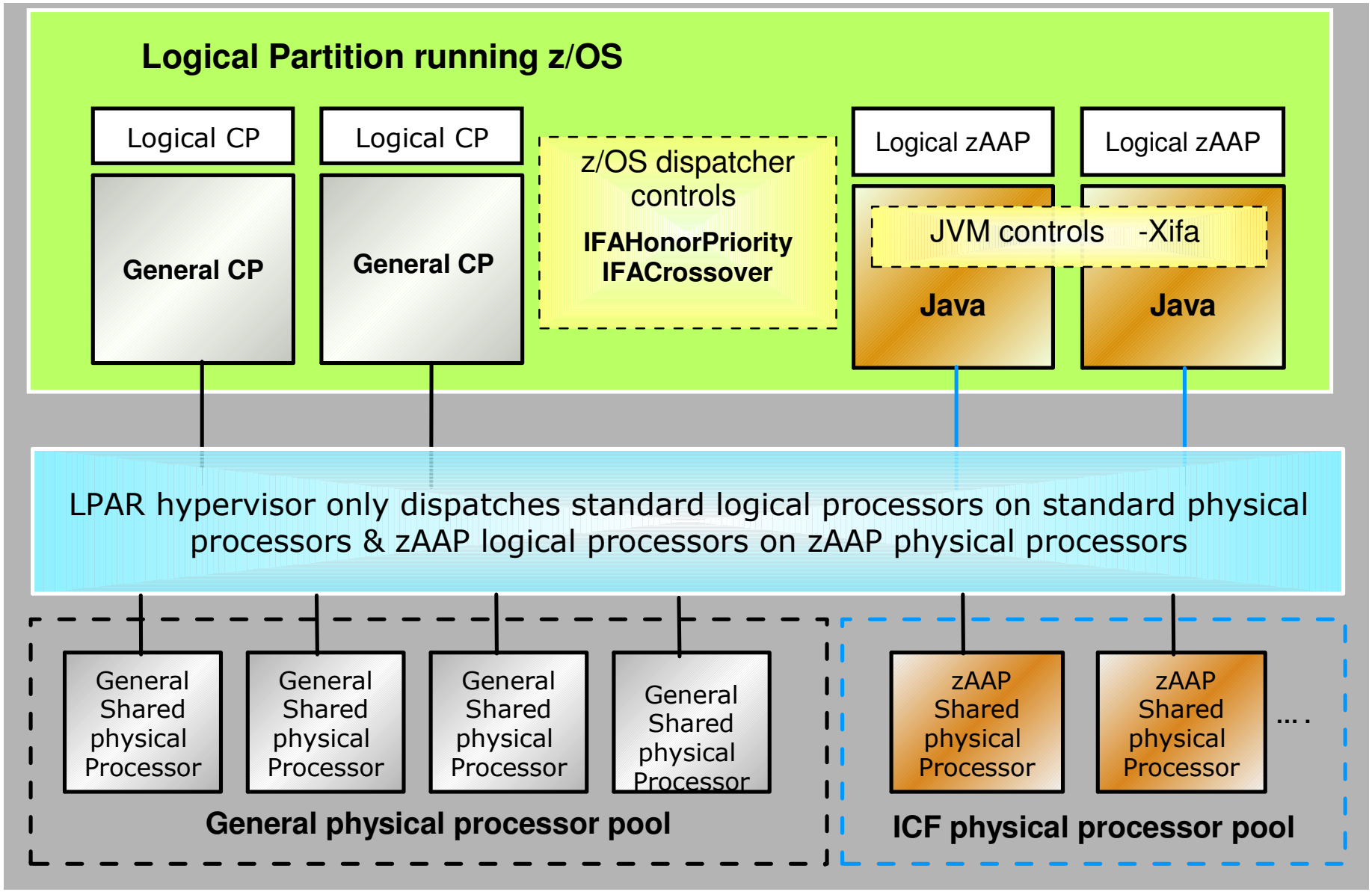
JVM options

- **-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.

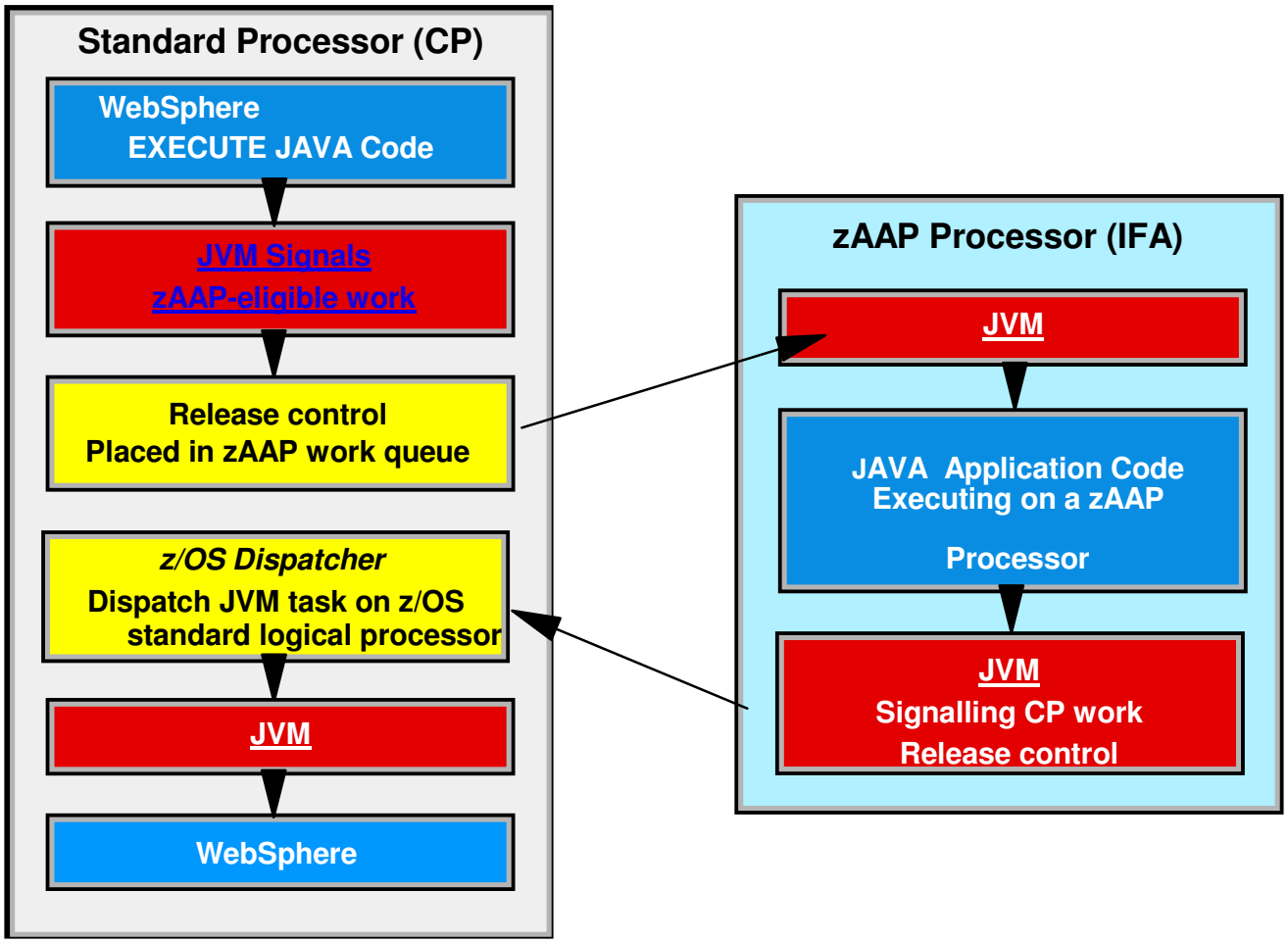
IBM SDK for z/OS, Java 2 Technology Edition, SDK V1.4

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



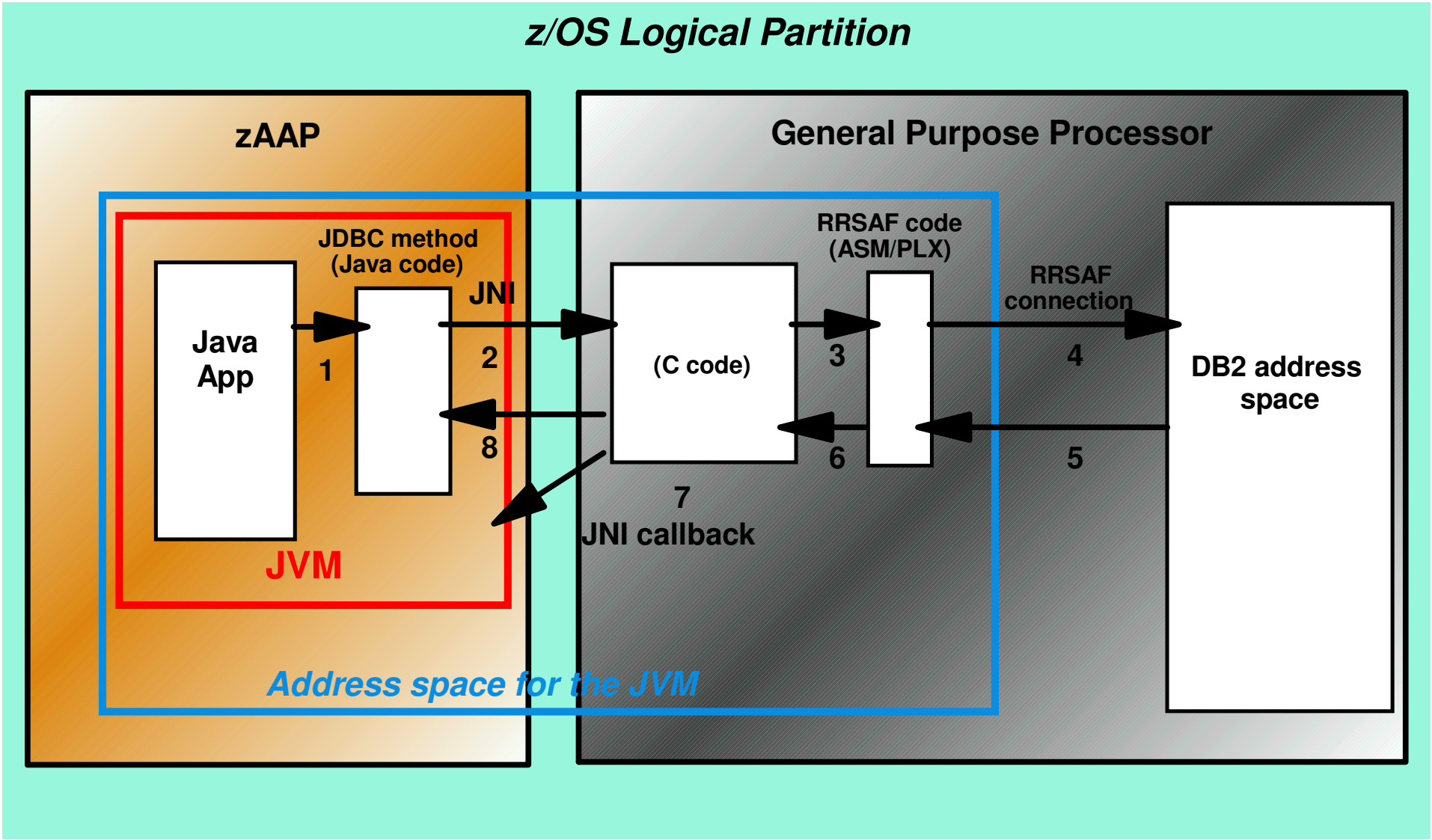
IBM JVM communicates to z/OS dispatcher when zAAP-eligible code is to be executed

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 zAPPs (#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

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

Z890	*Max #zAAPs*	*Max LPAR CP+zAAP*
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
ID  CPU                SERIAL
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 DESCRIPTOR
CPC 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     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                     148.0               1.73
 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

```
                                                C P U   A C T I V I T Y
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----  -CAPPING--  PROCESSOR-  ----DISPATCH TIME DATA----   LOGICAL PROCESSORS  --- PHYSICAL PROCESSORS --
NAME       S   WGT  DEF    ACT  DEF   WLM%  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                                   APPL% CP      49.3   EXP BLK    0.0
REM ENC  0.00                                             ABSRPTN    11K   APPL% IFACP   33.9   EXP SHR    0.0
MS ENC   0.00                                             TRX SERV   11K   APPL% IFA    184.9
1                                      W O R K L O A D   A C T I V I T Y                                          PAGE   3
      z/OS V1R5              SYSPLEX SANDBOX           DATE 07/28/2004          INTERVAL 09.59.979   MODE = GOAL
                        CONVERTED TO z/OS V1R5 RMF     TIME 15.00.00

                                    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 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 1 2-7	Indicator for IFA cross-over Indicator for IFA honor priority 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)*

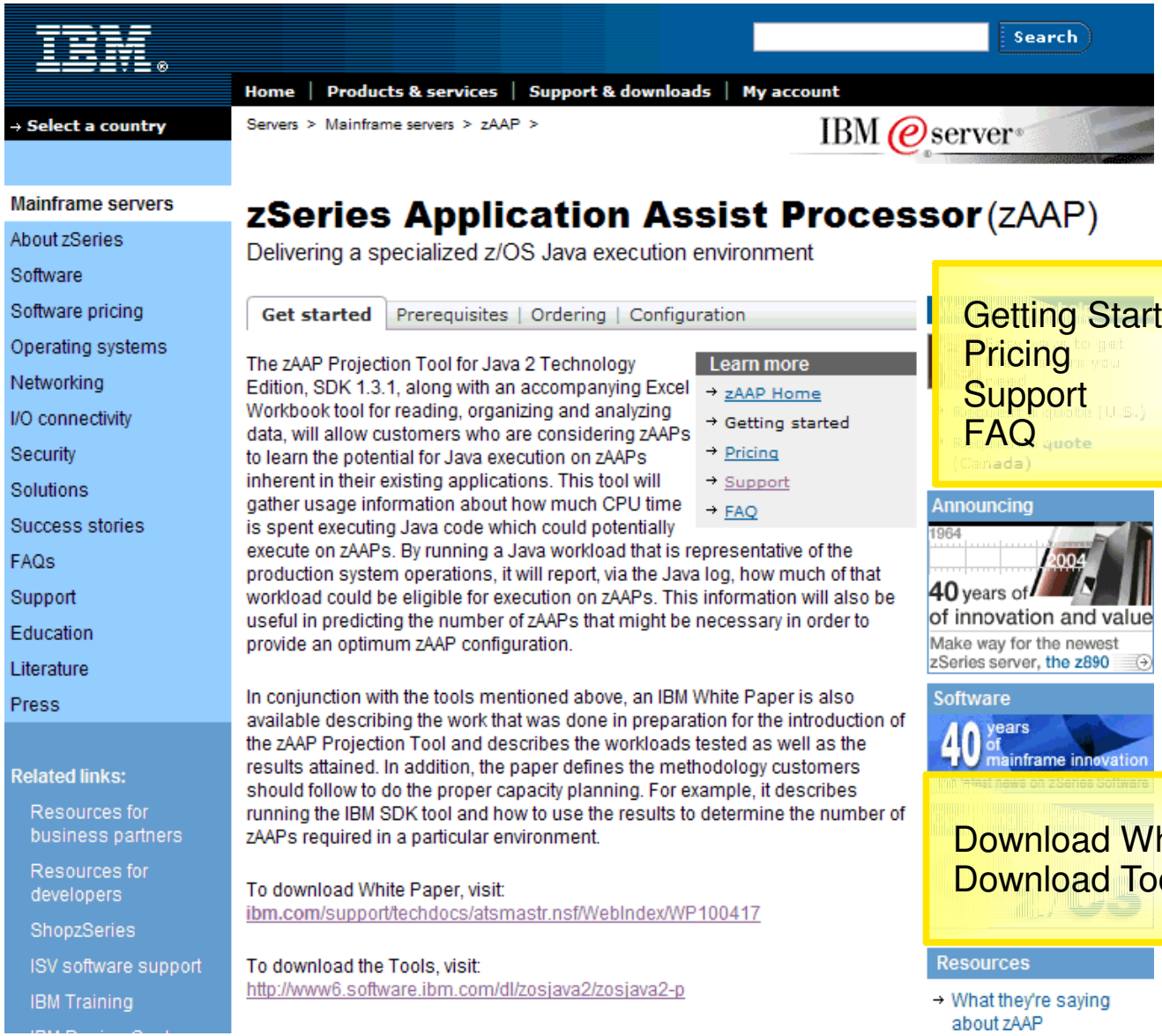
Projection Tool for Java 2 Technology Edition

- 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

Subsystem	*zAAP Projection Tool for Java 2 Technology Edition, SDK V1.3.1*	*IBM SDK for z/OS, Java 2 Technology Edition, SDK V1.4*
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

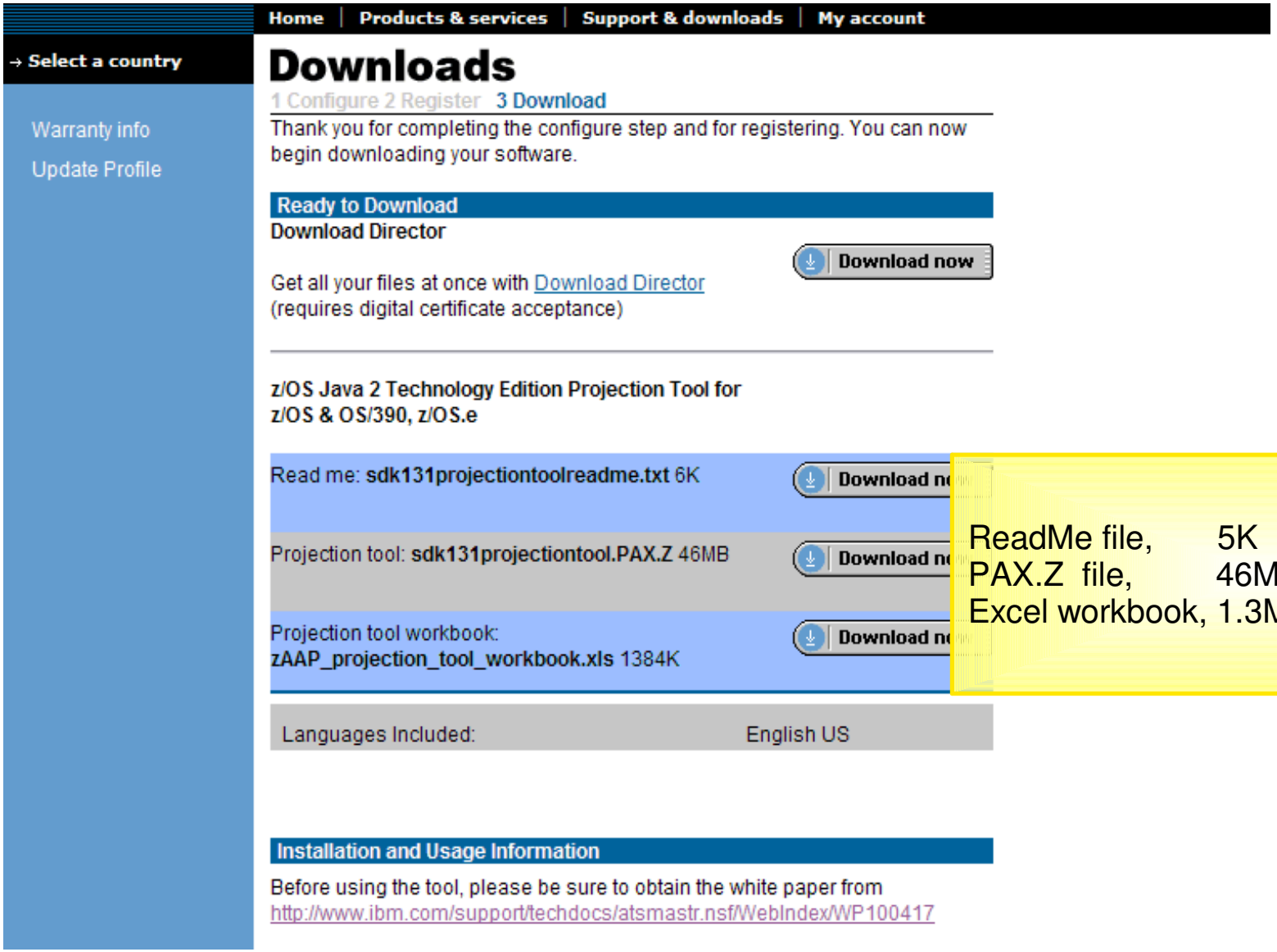


Getting Started
Pricing
Support
FAQ

Download Whitepaper
Download Tool

zAAP Home Page ibm.com/servers/eserver/zseries/zaap

Projection Tool Download



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 Readme.txt file for the latest maintenance information

- Check the following APARs
- PQ26125
- PQ26525
- PQ36944
- PQ39622
- PQ39940
- PQ40027
- OW47432
- OW54362 or OW55013
- PQ60748

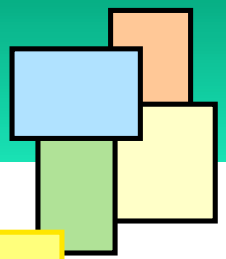
zAAP Projection Tool – Java SDK 1.3.1

ibm.com/servers/eserver/zseries/zaap/

1 - Download from IBM site

4 - Run Appl measurement

WebSphere Server, JVM 1.3.1



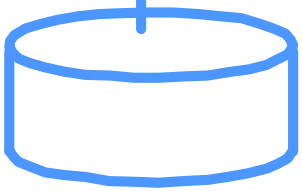
3 – Install instrumented JVM

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

2 - FTP PAX.Z file to z/OS HFS

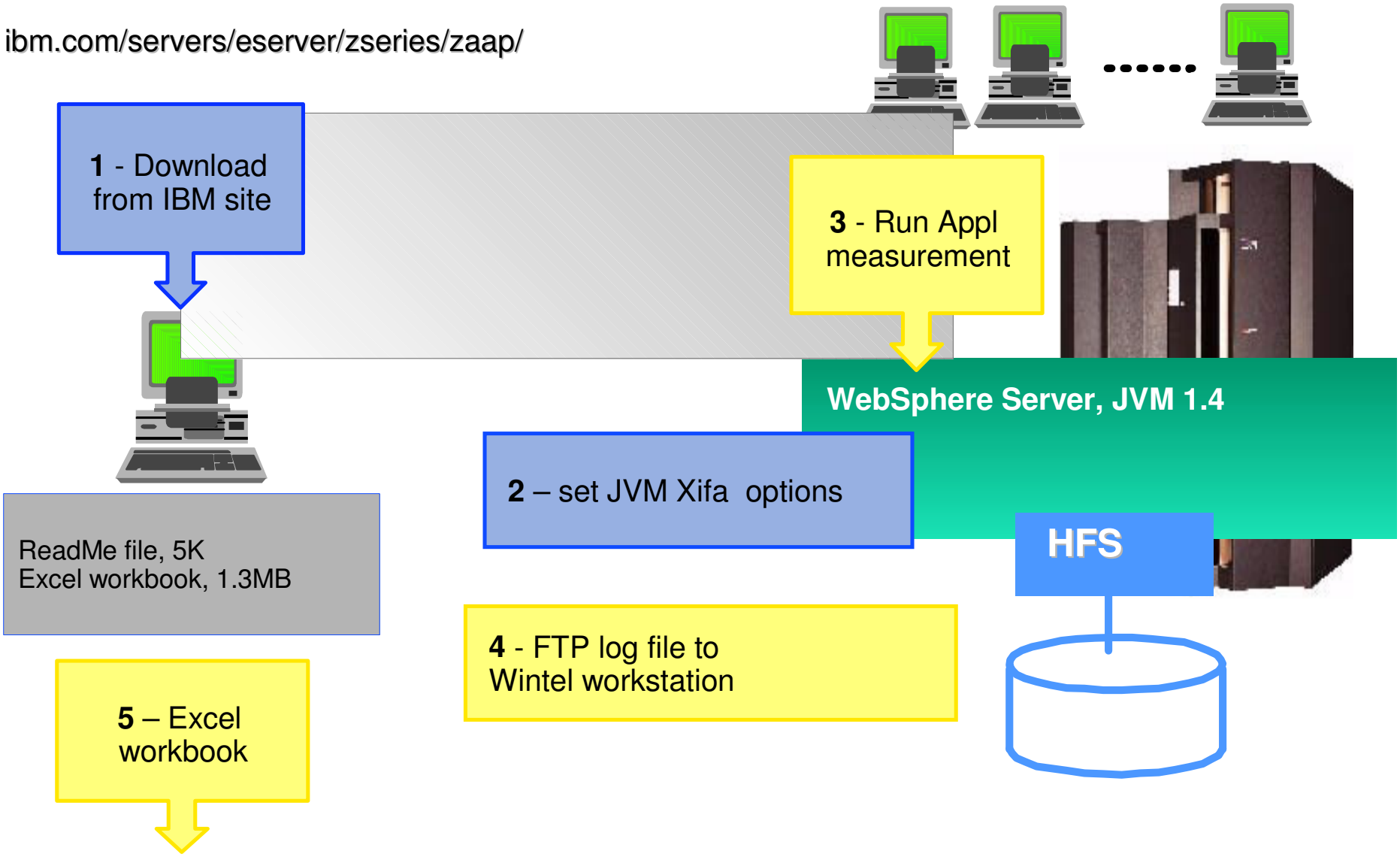
5 - FTP log file to Wintel workstation

6 – Excel workbook

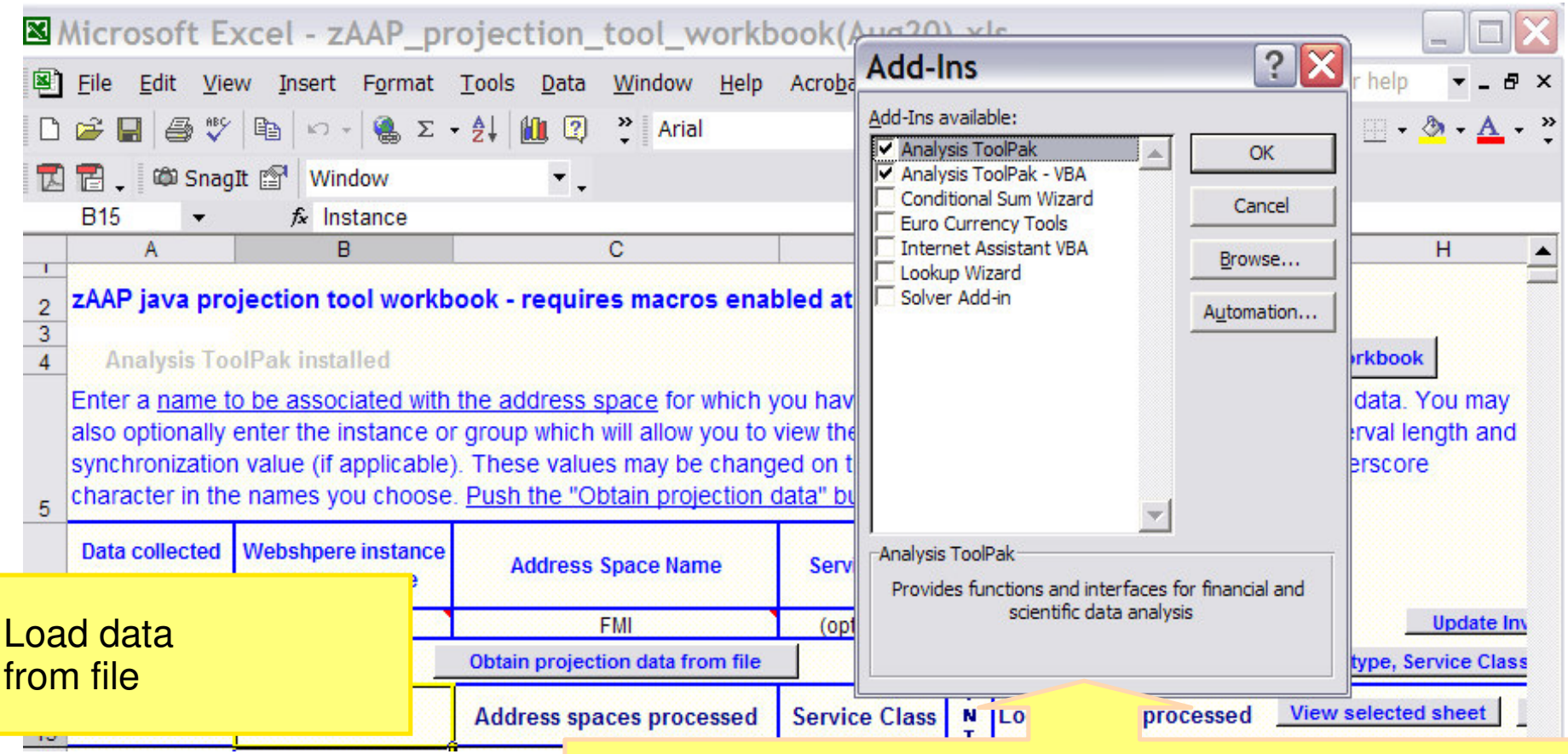


zAAP Projection Tool – Java SDK 1.4

ibm.com/servers/eserver/zseries/zaap/



Excel Workbook



Load data from file

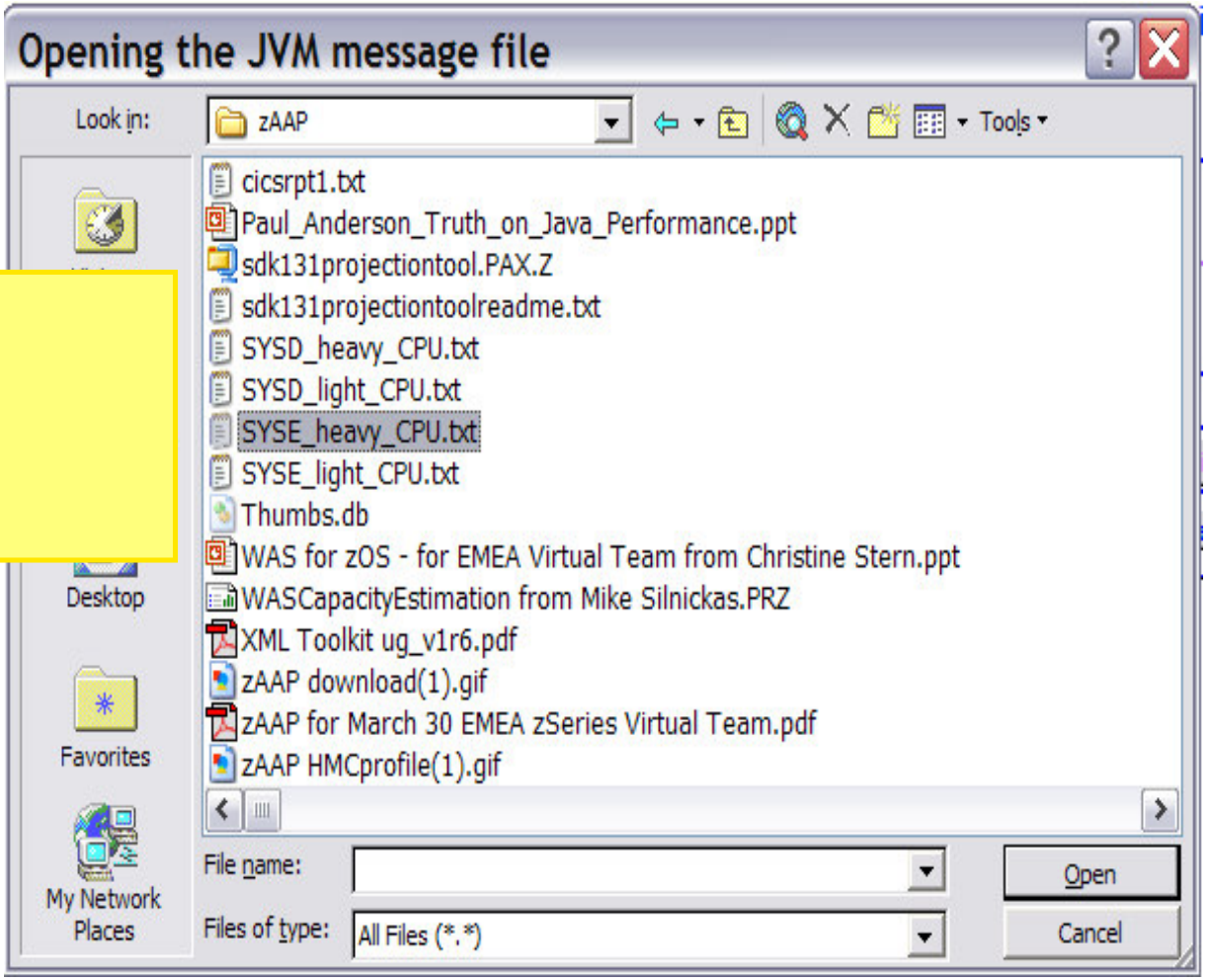
Required Addin: Select ***Tools*** then ***Add-Ins***
Check ***Analysis Toolpak*** and ***Analysis Toolpak - VBA*** and then click Ok.

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 Go to Inventory	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
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

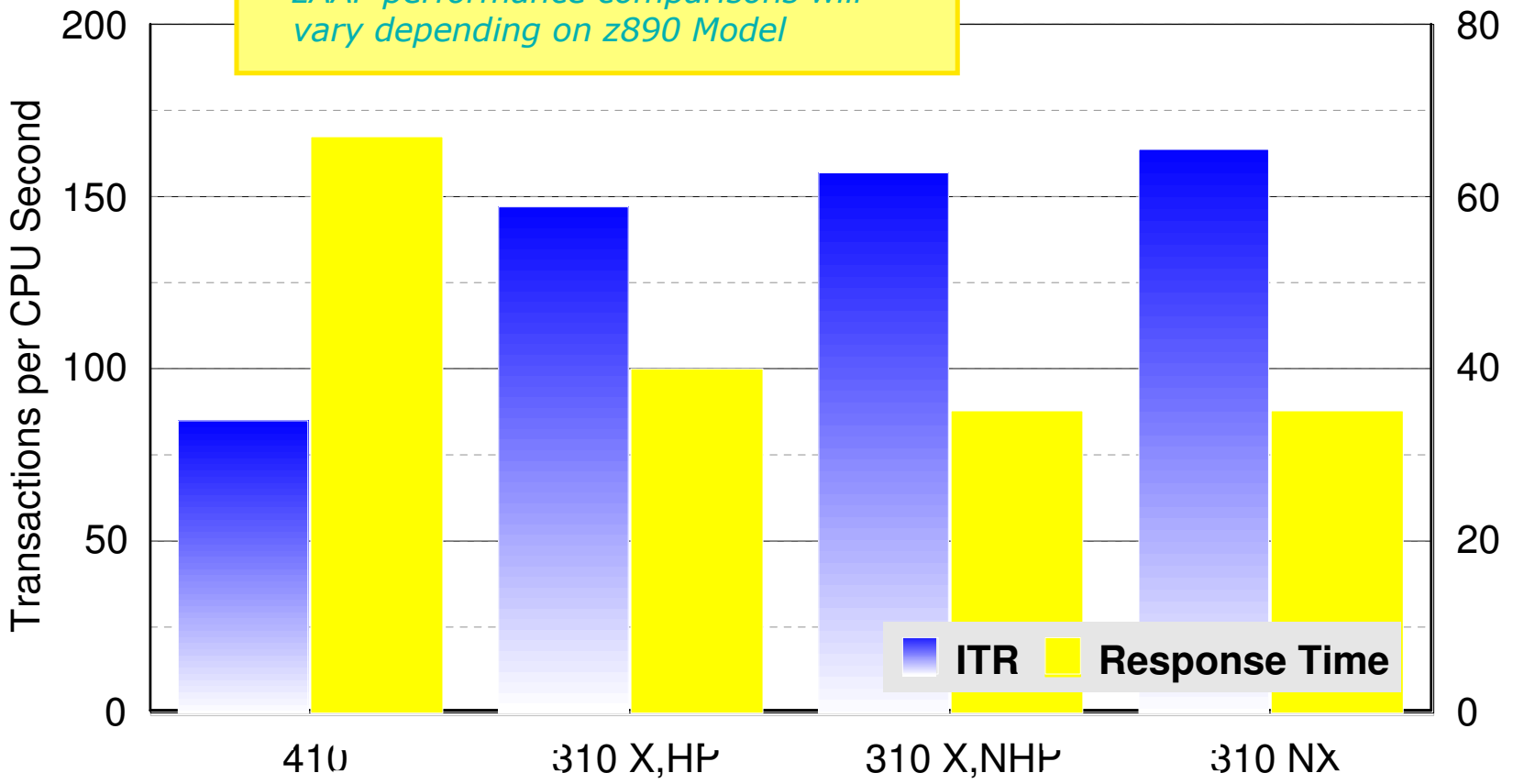
Hints *(ROTs)*

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

zAAP performance comparisons will vary depending on z890 Model



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

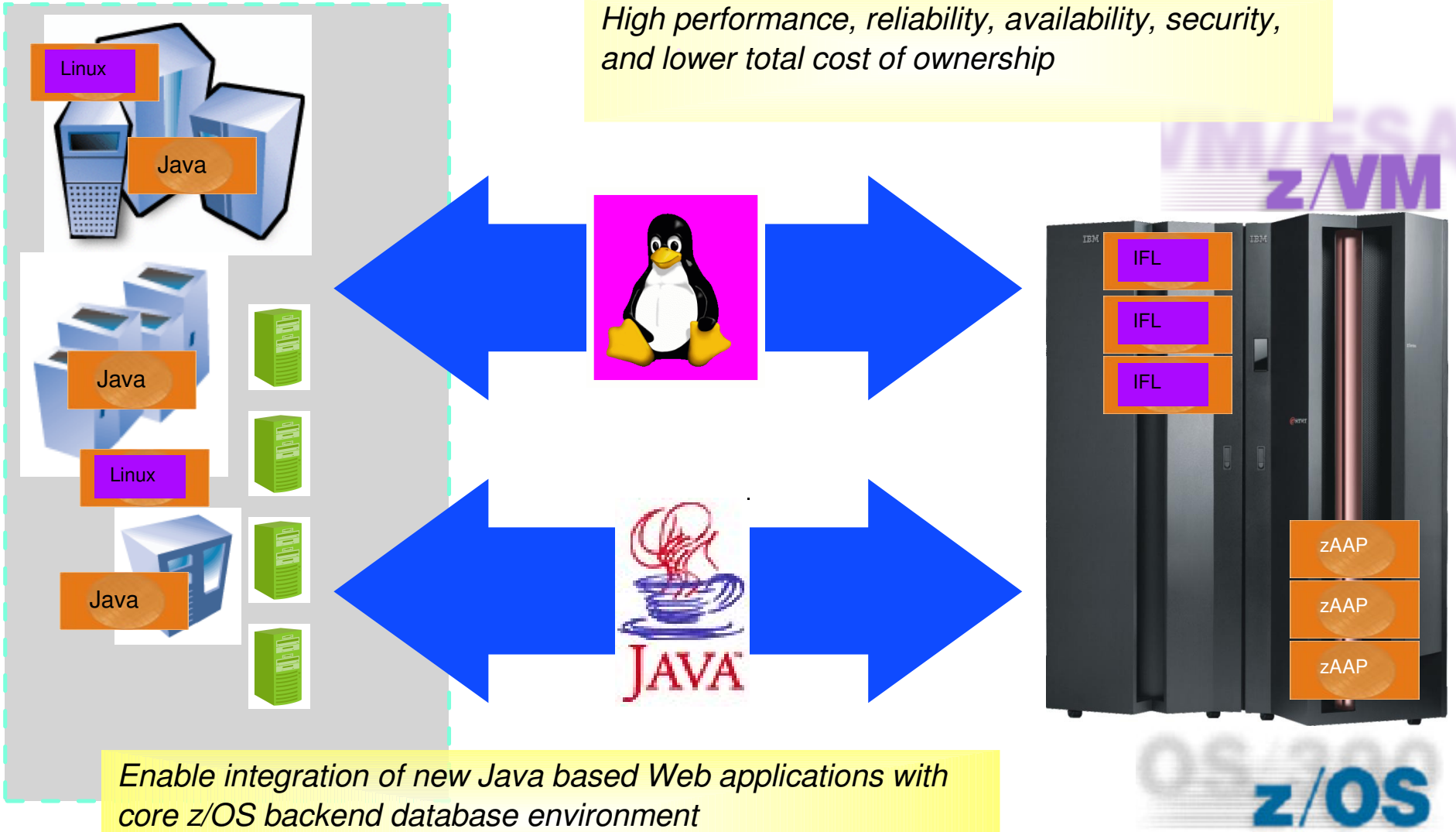
zAAP runs at
Model 170 engine speed

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*
- zAAP Web site
  - *ibm.com/zseries/zaap*
- z/OS Migration site
  - *ibm.com/zseries/zos*

Obrigado !!!!