# zPCR Capacity Sizing Lab

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IBM

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# zPCR Capacity Sizing Labs

- **Part 1 - Intro and Overview**

  – zPCR Introduction

  – Includes Advanced Mode Update

  – What's new in zPCR V8.4 in Back Up

- **Part 2 – Hands-on Lab**

  – 1 Exercise to demonstrate the use of Advanced Mode functions in zPCR

    • 6 Tasks
    • 2 Additional Analysis to Try

  – Use as a refresher

# zPCR Capacity Sizing Lab – Part 1 Introduction and Overview

**SHARE - Session 14219**

August 15, 2013

**John Burg**

**IBM**

# Agenda

- **Introducing zPCR**

- **LSPR Background**

- **MIPS Tables vs. zPCR LPAR Configuration Capacity Planning**

- **zPCR Basic / <u>Advanced Mode</u>**

- **zPCR Preferences**

- **zPCR Execution Flow**

- **EDF Files**

- **zPCR Output**

- **Where to get more Information**
- **Summary**

# Introducing zPCR

- **Provides capacity relationships for System z processors, considering**
  - LPAR configurations
  - SCP/workload environment
  - Use of specialty CPs (zAAP, zIIP, IFL, and ICF)

- **Based on IBM Large Systems Performance Reference (LSPR)**

- **The IBM tool to properly size mainframe upgrades**
  - Expected accuracy of ±5%

- **A PC based tool written in Java for Windows XP/Win 7**
  - "As Is", no charge tool available from the web
  - Available to customers

- **New Processor Announcements available in zPCR for:**
  - IBM Account Teams - at Announcement
  - Customers - generally within 30 days after Announcement

# zPCR Logo Window
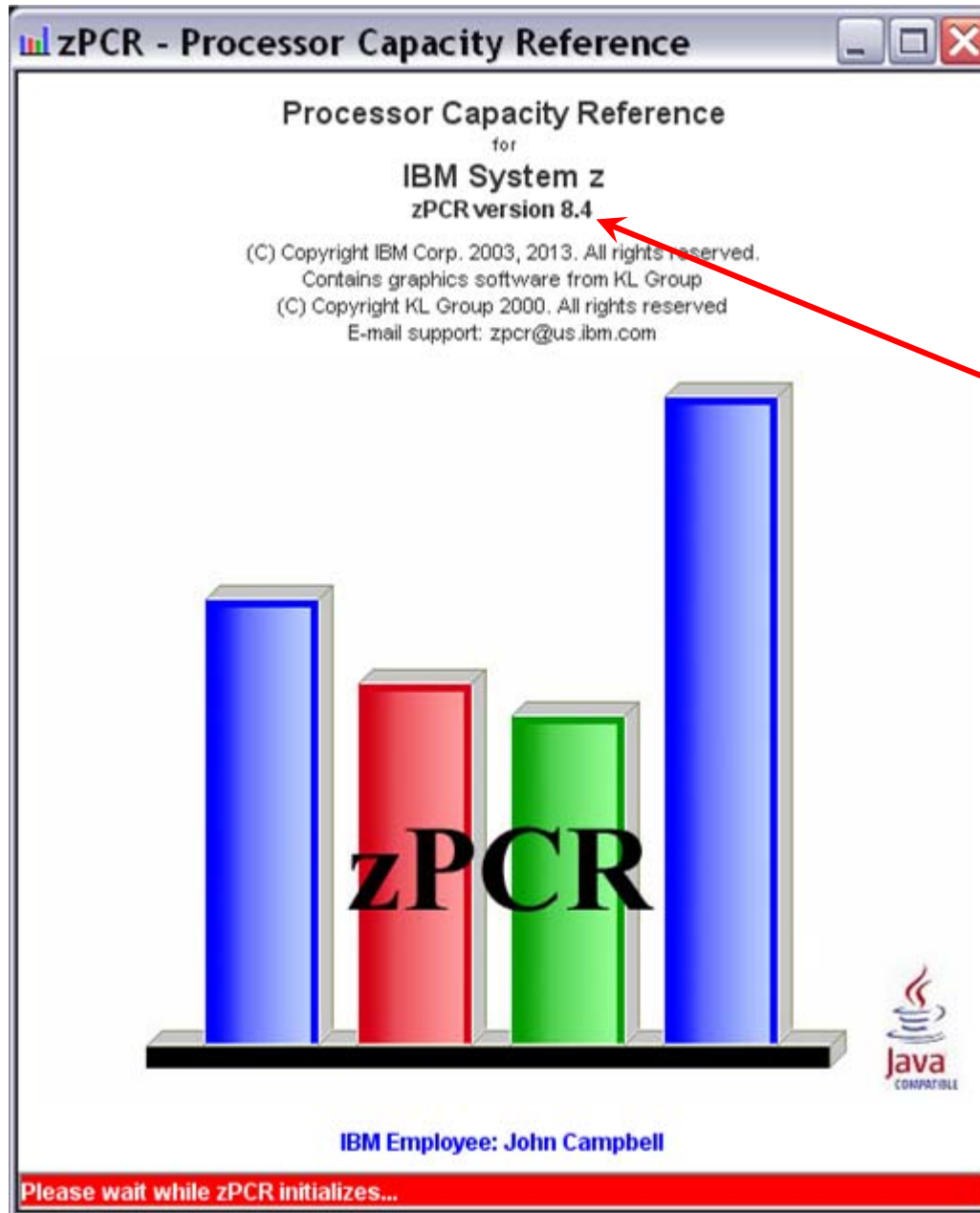


Version Identification

# New Day Dawning in System z Capacity Planning

**Processor Design**
- **CPU**
- **Memory Hierarchy (Nest)**

**Hipervisor (PR/SM)**
- **Amount of virtualization**

Memory

L4 Cache **Nest**

L3 Cache ••• L3 Cache

L2 L2 L2 L2
L1 L1 L1 L1
CPU1 ••• CPU4 CPU1 ••• CPU4
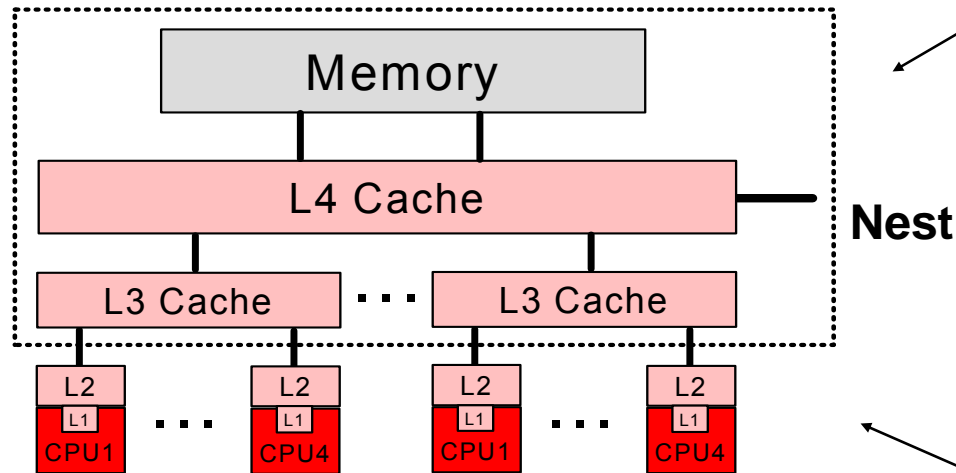
**Operating System**
- **Virtualization at address space level**

**Workload Characteristics**
- **Instructions**
- **Dispatch Profile**
- **I/O Rate**

# Introduction to LSPR

- **A set of representative SCP/workload environments**
  - SCPs: z/OS, z/VM, and Linux on System z
  - Workload categories: Low ←Relative Nest Intensity→ High
  - A methodology focused on processor capacity
  - No significant external constraints
  - Equivalent (reasonably high, e.g. >= 90%) processor utilization

- **A metric to communicate the results**
  - ITR: Internal Throughput Rate
  - Transactions or Jobs per processor busy second

- **Information stored on the web**
  - https://www.ibm.com/servers/resourcelink/lib03060.nsf/pages/lsprindex?OpenDocument

# LSPR Benchmarks

- LSPR data is built from a set of benchmarks running representative workloads

- Over time, LSPR benchmarks are changed to reflect changes in processor architecture, operating system capabilities, and new patterns for production workloads

  – **LSPR tables are labeled based on the z/OS operating system level used <u>at time of the benchmark</u>**

- Cannot directly compare relative processor capacity across different versions of LSPR benchmarks

# LSPR Workload Categories

- Various combinations of workload primitives are measured on which the new workload categories are based
  - **Applications include CICS, DB2, IMS, OSAM, VSAM,  WebSphere,  COBOL, utilities**

- Low (relative nest intensity)
  - **Workload curve representing light use of the memory hierarchy**
  - **Similar to past high scaling workload primitives**

- Average (relative nest intensity)
  - **Workload curve expected to represent the majority of customer workloads**
  - **Similar to the past LoIO-mix curve**

- High (relative nest intensity)
  - **Workload curve representing heavy use of the memory hierarchy**
  - **Similar to the past DI-mix curve**

- zPCR extends published categories
  - **Low-Avg**
    - **50% Low and 50% Average**
  - **Avg-High**
    - **50% Average and 50% High**

# LSPR Tables

- **Multi-image (MI) Processor Capacity Ratio table**
  - <u>Median</u> complex LPAR configuration for each model based on customer profiles
  - Most representative for vast majority of customers
  - Same workload assumed in every partition
  - z/OS data is presented
    - Capacity values considered representative for z/VM and Linux
  - Used for "high level" sizing, e.g. "MIPS Tables"
  - Used to develop the MSU rating

# MIPS Tables vs zPCR

- **MIPS Tables**

  - Adequate for Business Planning

    - High level sizing for hardware and software budget planning
    - Based on "averages"

  - Must be referenced to a specific set of LSPR benchmarks or invalid

- **zPCR Sizing - LPAR Configuration Capacity Planning**

  - Detailed Capacity Sizing based on:
    - Specific LPAR configuration (number, weights, and logical processors)
    - Specific SCP/workload mix
    - Specific use of specialty engines (zAAP, zIIP, IFL, and ICF)
  - Built around concept of a Reference CPU

# zPCR Home Page

**MIPS Table**

**LSPR Multi-Image**

**zPCR LPAR Configuration Capacity Planning**

**Setting the Reference Processor**
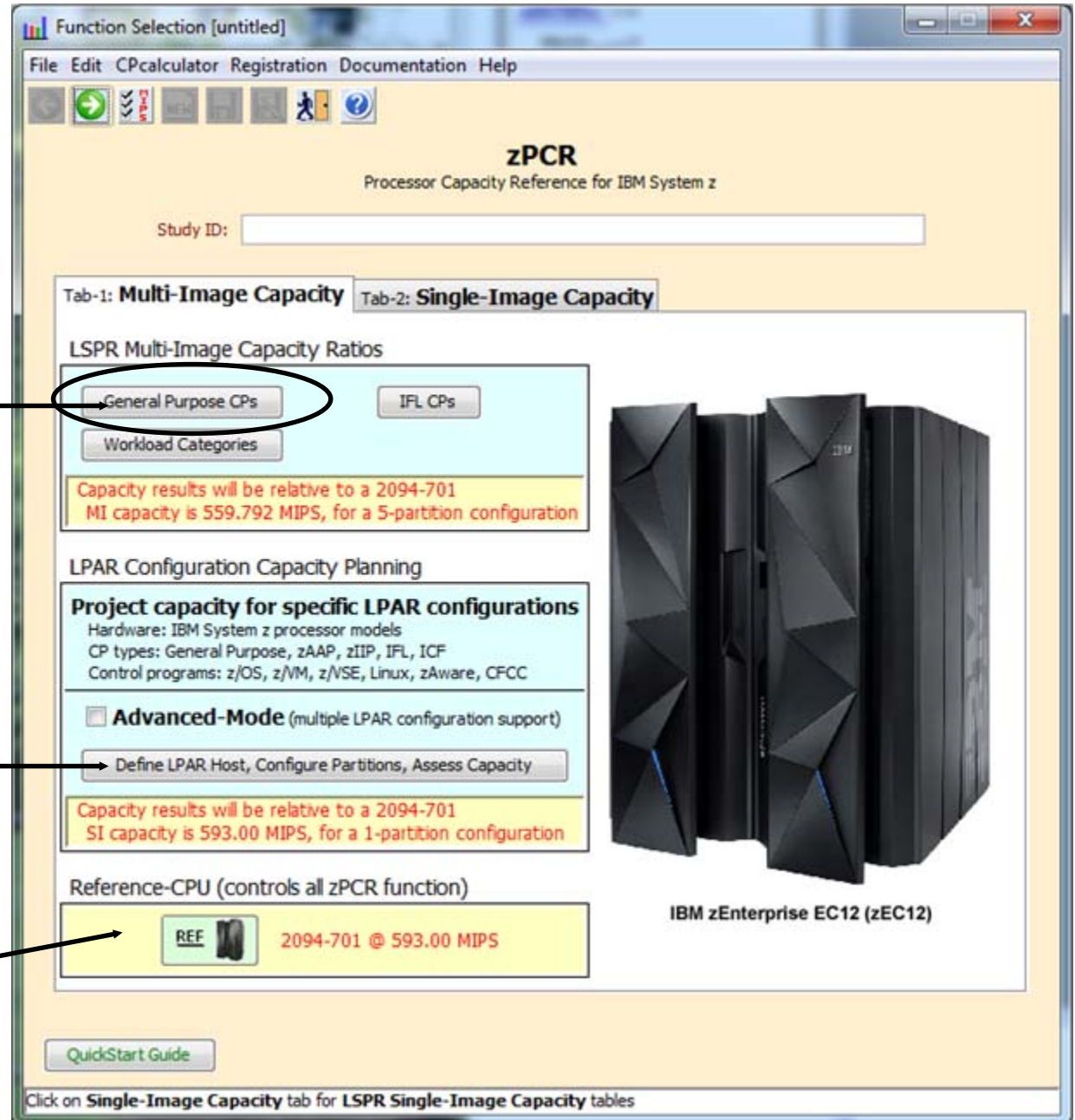
# zPCR Basic Mode and Advanced Mode

- **zPCR can be run in 2 Modes:**

  – Basic Mode
  - Operates on <u>1 processor</u> configuration at a time


  – Advanced Mode
  - Operates up to <u>7 processor configurations</u> at a time
  - Shows <u>Capacity Comparisons between 2 LPAR configurations</u>
  - More efficient than running zPCR multiple times
    – Manually comparing the results
  - Recommended Mode

# Introducing zPCR– Advanced Mode

# zPCR Advanced Mode

- **Provides Capacity Comparisons between 2 processor configurations**
  - The "Configuration #1" Vs ("Configuration #2, Configuration #3…Configuration #7)
  - More efficient than running zPCR multiple times and manually comparing the results
  - Ability to drag & drop RMF partition reports, zPCR files and EDF* files onto "Configuration #"

- **Recommended when comparing capacity changes including:**
  - Changing the LPAR host processor family
  - Changing the LPAR host processor's CP configuration
  - Changing the way that one or more partitions are defined, (e.g. weights, LCPs, SEs)
  - Adding one or more new partitions
  - Deleting one or more current partitions

- **For Capacity Comparisons to be useful, configurations being compared should both contain some or all of the same partitions**
  - (i.e., in terms of partition type, name, SCP, and workload)

**\* Note: EDF (Enterprise Data Files) are new with zPCR 7.x and are created using CP3KEXTR for z/OS and CP3KVMXT for z/VM**

# Advanced Mode Function

- **Multiple processor configurations**
  - Up to seven can be defined

- **Several additional functions are available**
  - *LPAR Host / Partition Comparison Reports*
    - Compares capacity results between LPAR configurations
  - *Margin of Error Consideration*
    - Shows the effect on capacity when ±5% margin-of-error is applied
  - *Optimize SHR LCPs*
    - Optimizes LCPs
  - *LPAR Host Capacity Summary*
    - Summarizes MIPS by pool type for Current and all Alternates

- **All capacity values based on a single Reference-CPU setting**
  - 1-way processors only

# Reference CPU and Typical

**Reference Processor**

– Used to scale the capacity all of the LSPR processors relative to this processor

  • Must be set to any IBM System z 1-way model (GCP model)

**"Typical"**

– 2094-701

  • 593 MIPS

– IBM recommended and widely accepted in the Industry

It is critical all capacity being compared be obtained using a <u>consistent</u> ***Reference-CPU*** metric

<u>Reference-CPU</u>                 **zPCR Comparison Reports**

|  | 2094-701 | z196 708 | zEC12 708 | Relative Capacity Difference |
|---|---|---|---|---|
| Relative Capacity | 1.00 | 13.61 | 16.97 | 1.25 |
| MIPS | 593 | 8,072 | 10,063 | (1,991 MIPS) 1.25 |

**zPCR Function Selection Window**



Set "Startup" preferences

**Default zPCR
Startup
Preferences**
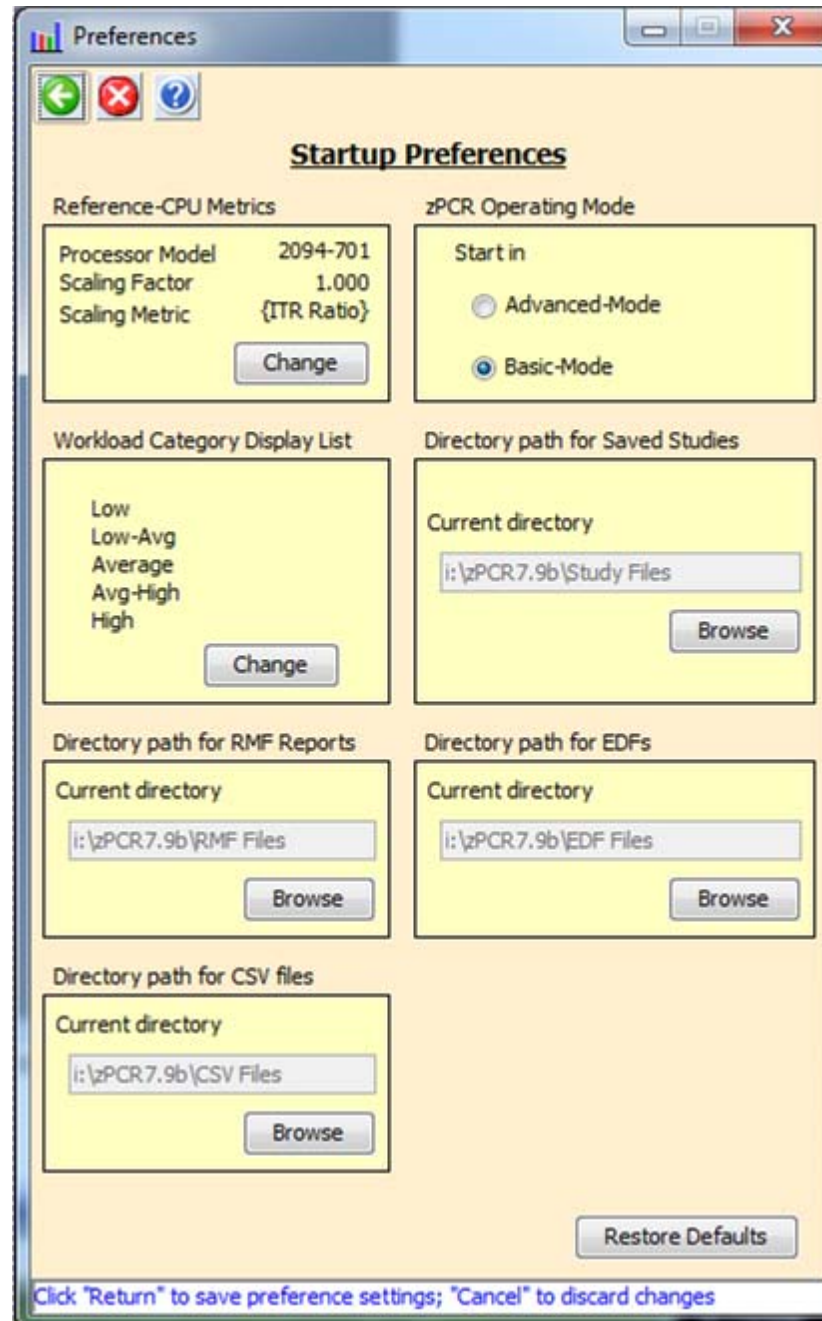
**Recommended zPCR Startup Preferences**



**Preferences**

**Startup Preferences**

Reference-CPU Metrics

| Processor Model | 2094-701 |
| Scaling Factor | 593.00 |
| Scaling Metric | MIPS |

Change

Workload Category Display List

Low
Low-Avg
Average
Avg-High
High

Change

Directory path for RMF Reports

Current directory

i:\zPCR7.9b\RMF Files

Browse

zPCR Operating Mode

Start in

○ Advanced-Mode

○ Basic-Mode

Directory path for Saved Studies

Current directory

i:\zPCR7.9b\Study Files

Browse

Directory path for EDFs

Current directory

i:\zPCR7.9b\EDF Files

Browse

Directory path for CSV files

Current directory

i:\zPCR7.9b\CSV Files

Browse

Restore Defaults

Click "Return" to save preference settings; "Cancel" to discard changes

**Set "Advanced Mode" as the default when starting zPCR**

**Set "Reference-CPU" Metrics to "Typical" as the default**

# Reference CPU

- **Reference Processor Window**
  - The ***Reference-CPU*** window is accessed primarily from the ***Function Selection*** window by clicking the **Reference-CPU** button

Select "Typical"

**zPCR Function Selection Window**



Function Selection [untitled]

File  Edit  CPcalculator  Registration  Documentation  Help

## zPCR
Processor Capacity Reference for IBM System z

Study ID:

Tab-1: **Multi-Image Capacity**    Tab-2: **Single-Image Capacity**

LSPR Multi-Image Capacity Ratios

General Purpose CPs          IFL CPs

Workload Categories

Capacity results will be relative to a 2094-701
MI capacity is 559.792 MIPS, for a 5-partition configuration

LPAR Configuration Capacity Planning

**Project capacity for specific LPAR configurations**
Hardware: IBM System z processor models
CP types: General Purpose, zAAP, zIIP, IFL, ICF
Control programs: z/OS, z/VM, z/VSE, Linux, zAware, CFCC

☑ **Advanced-Mode** (multiple LPAR configuration support)

Enter Advanced-Mode

Capacity results will be relative to a 2094-701
SI capacity is 593.00 MIPS, for a 1-partition configuration

Reference-CPU (controls all zPCR function)

REF      2094-701 @ 593.00 MIPS

IBM zEnterprise EC12 (zEC12)

QuickStart Guide

Click on **Single-Image Capacity** tab for **LSPR Single-Image Capacity** tables

Select "Advanced-Mode" check box and press "Enter Advanced-Mode"

**zPCR Advanced-Mode Capacity Planning Control Panel**

Advanced-Mode Control Panel [untitled]

File  CPcalculator  Documentation  Help

**Advanced-Mode Capacity Planning Control Panel**

Study ID:

Double click on a tree branch below to access the relevant windows

Reference-CPU
  REF  2094-701 @ 593.00 MIPS

LSPR Multi-Image Processor Table
  General Purpose CPs
  IFL CPs

LPAR Configurations
  #1  Configuration #1

Manage    Compare    Migrate & Analyze

QuickStart Guide

No LPAR configurations are defined

Define an LPAR configuration ...
    +Drag & drop a zPCR study file, EDF, or RMF file onto the LPAR configuration icon
    +Double-click the LPAR configuration icon for manual definition windows
Create additional LPAR configurations ...
    +Click the "Add{+}" toolbar icon and define the LPAR configuration as described above
    +Select a defined LPAR configuration icon and click the "Clone{=}" toolbar icon
Rename LPAR configurations ...
    +Left-click to select the LPAR configuration icon
    +Right-click LPAR configuration icon for pop-up menu and click "Rename Configuration"
    +Enter new name and press ENTER
Delete LPAR configurations ...
    +Select LPAR configuration icon and click the "Delete{X}" toolbar icon

View "QuickStart" Guide

View Muli-Image LSPR table

LPAR Configurations Right "click" to rename up to 20 characters
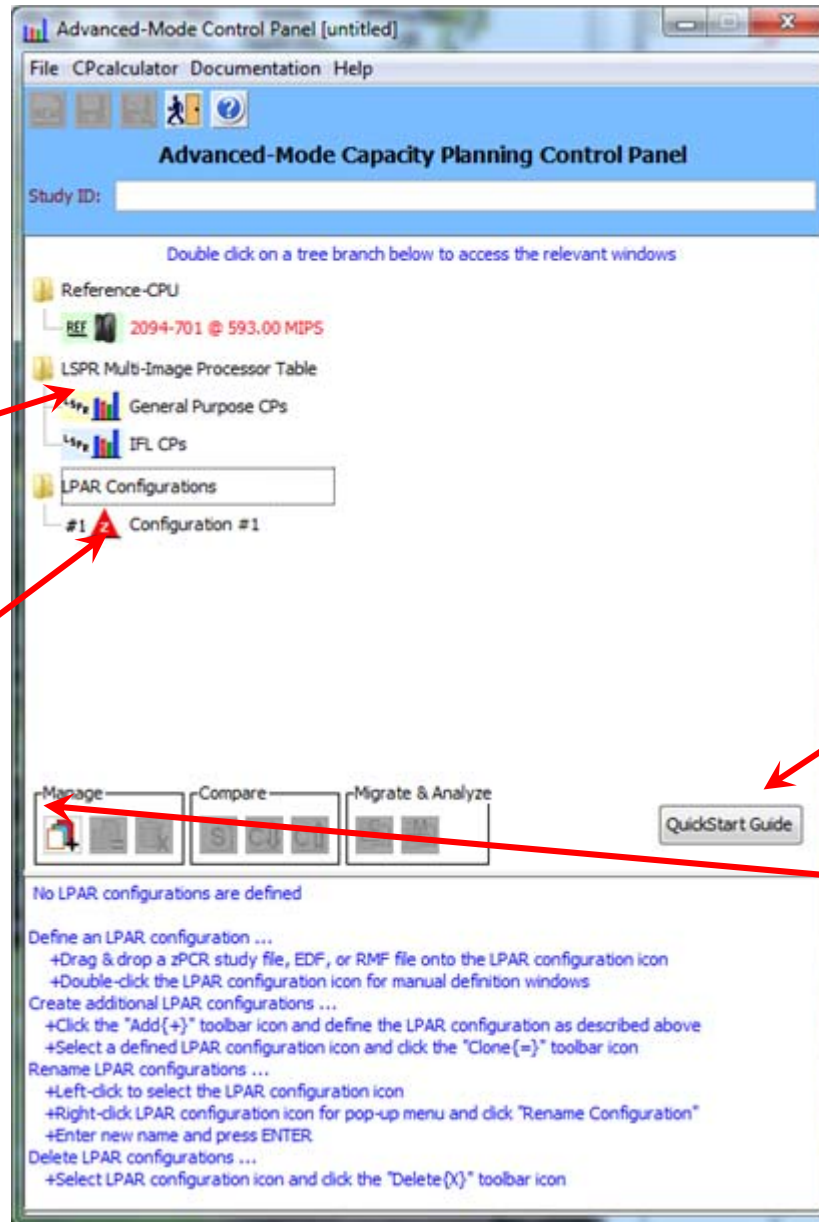
Manage Multiple Configurations

You may drag and drop zPCR study files, RMF reports or EDFs onto the LPAR Configurations planning area or use the file drop down to load zPCR study files.

**zPCR Advanced-Mode Capacity Loading a file via Drag and Drop**
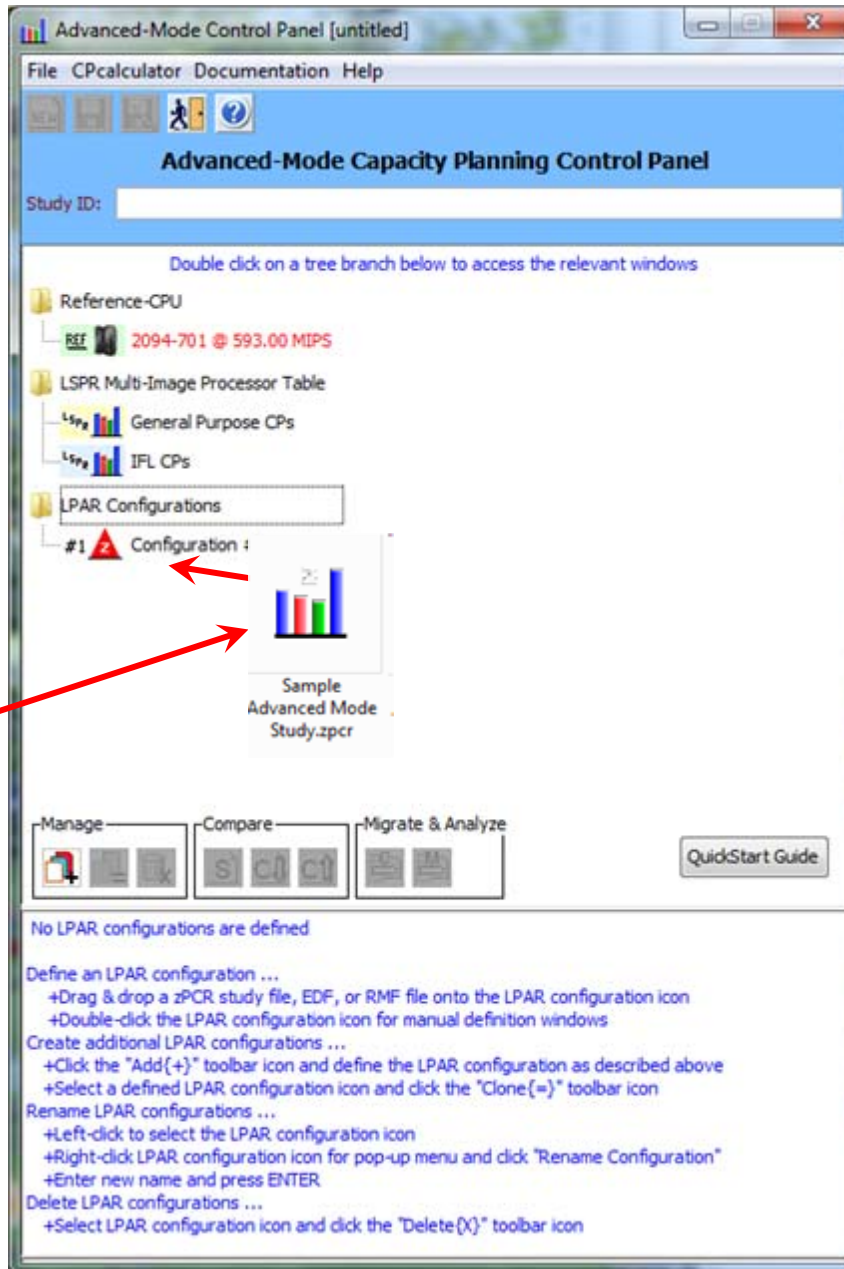


Browse Windows Explorer to find the file then "drag" it to the zPCR Advanced Mode" window and "drop" it on Current

## zPCR Advanced-Mode Capacity Renaming the configuration step 1



Select "Configuration #1", Right Click, Click on "Rename Configuration"

**zPCR Advanced-Mode Capacity Renaming the configuration step 2**
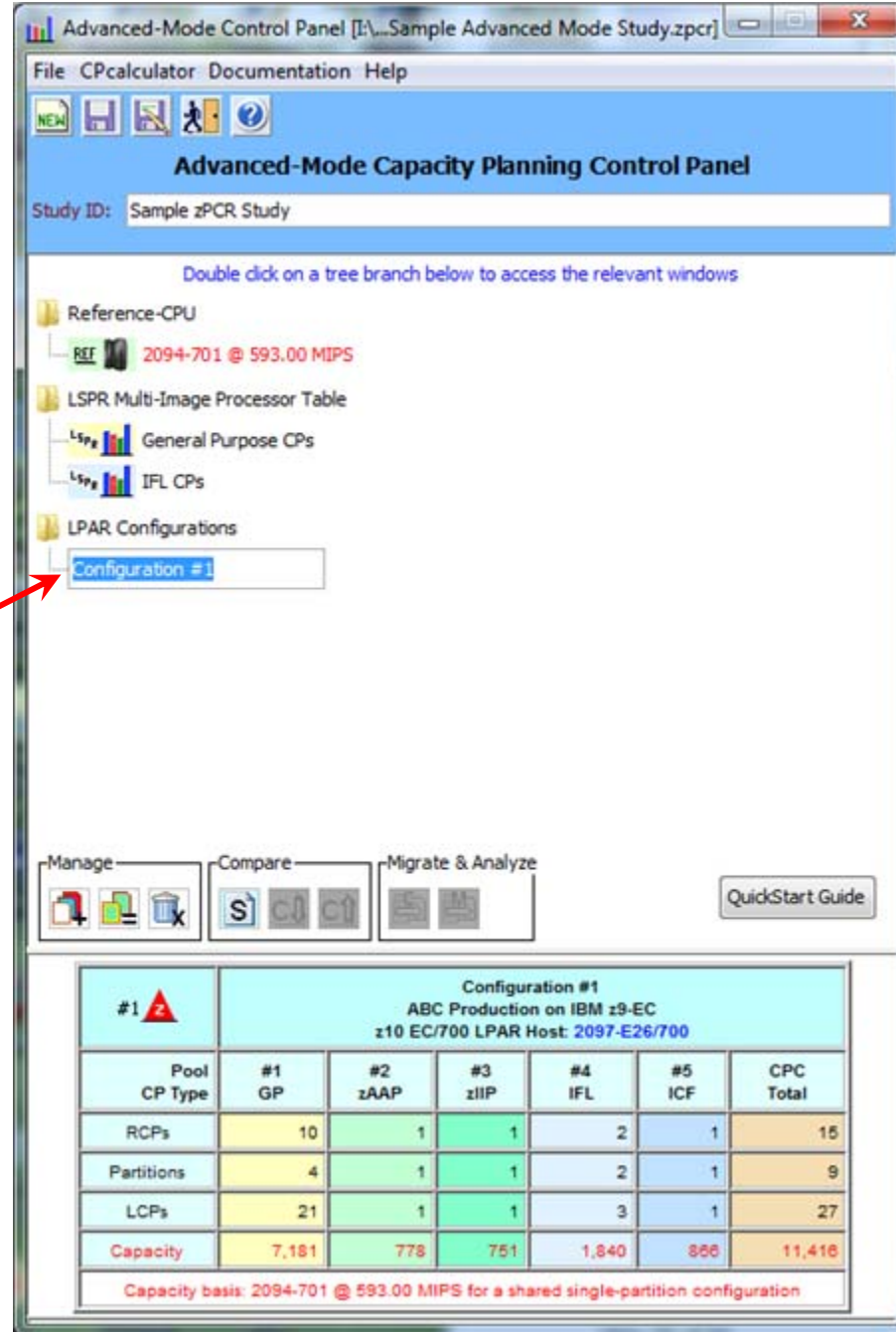


Type over "Configuration #1" with "z10 2097 E26" and Press Enter

**zPCR Advanced-Mode Capacity Planning Control Panel**



Configuration Renamed

Configuration Summary

## zPCR Advanced-Mode Capacity Planning Control Panel



1 Select
2 then Click on Clone

**zPCR Advanced-Mode Capacity Planning Control Panel**



Advanced-Mode Control Panel [I:\...Sample Advanced Mode Study.zpcr]

File  CPcalculator  Documentation  Help

**Advanced-Mode Capacity Planning Control Panel**

Study ID:  Sample zPCR Study

Double click on a tree branch below to access the relevant windows

Reference-CPU
REF  2094-701 @ 593.00 MIPS

LSPR Multi-Image Processor Table
LSPR  General Purpose CPs
LSPR  IFL CPs

LPAR Configurations
#1  z10 2097-E26
#2  z10 2097-E40
#3  z196 2817-M15

**1) Select 2 Configurations then 2) Click on Comparison Report**

Manage | Compare | Migrate & Analyze

QuickStart Guide

**Note "Down Arrow" compares Bottom Configuration (#3) Relative to Top Configuration (#1)**

**"Up Arrow" compares Top Configuration (#1) Relative to Bottom Configuration (#3)**

#1 z

z10 2097-E26
ABC Production on IBM z9-EC
z10 EC/700 LPAR Host: 2097-E26/700

| Pool CP Type | #1 GP | #2 zAAP | #3 zIIP | #4 IFL | #5 ICF | CPC Total |
|---|---|---|---|---|---|---|
| RCPs | 10 | 1 | 1 | 2 | 1 | 15 |
| Partitions | 4 | 1 | 1 | 2 | 1 | 9 |
| LCPs | 21 | 1 | 1 | 3 | 1 | 27 |
| Capacity | 7,181 | 778 | 751 | 1,840 | 866 | 11,416 |

Capacity basis: 2094-701 @ 593.00 MIPS for a shared single-partition configuration

# Host Capacity Comparison Report



**LPAR Host Capacity Comparison Report**
**Capacity by Partition Type**
Study ID: Sample zPCR Study
z10 2097-E26: ABC Production on IBM z9-EC
z196 2817-M15: Cloned from z10 2097-E40
Capacity basis: 2094-701 @ 593.00 MIPS for a shared single-partition configuration
Capacity for z/OS on z10 and later processors is represented with HiperDispatch turned ON

| Partition Type | z10 2097-E26 #1 2097-E26/700: GP=10 zAAP=1 zIIP=1 IFL=2 ICF=1 | | | | | z196 2817-M15 #3 2817-M15/700: GP=10 zAAP=1 zIIP=1 IFL=2 ICF=1 | | | | | Full Capacity (MIPS) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Partitions | Usable RCPs | LCPs | SHR LCP:RCP | Capacity | Partitions | Usable RCPs | LCPs | SHR LCP:RCP | Capacity | Net Change | % Delta |
| GP | 4 | 10 | 21 | 2.100 | 7,181 | 4 | 10 | 21 | 2.100 | 10,107 | +2,926 | +40.7% |
| zAAP | 1 | 1 | 1 | 1.000 | 778 | 1 | 1 | 1 | 1.000 | 1,090 | +312 | +40.1% |
| zIIP | 1 | 1 | 1 | 1.000 | 751 | 1 | 1 | 1 | 1.000 | 1,072 | +321 | +42.7% |
| IFL | 2 | 2 | 3 | 1.500 | 1,840 | 2 | 2 | 3 | 1.500 | 2,347 | +507 | +27.6% |
| ICF | 1 | 1 | 1 | | 866 | 1 | 1 | 1 | | 1,140 | +274 | +31.6% |
| Total | 9 | 15 | 27 | | 11,416 | 9 | 15 | 27 | | 15,756 | +4,340 | +38.0% |

Comparison Report by Partition

[ Minimum Capacity ] [ Maximum Capacity ]

Show capacity as
◉ Full CPC   ○ Single-CP

[ Consider Margin-of-Error ]

For significant configuration changes, capacity comparisons should be considered to have a +/-5% margin-of-error
Upgrading the processor family is considered a significant configuration change

Click "Minimum Capacity" to get Partition Capacity Comparison Report

Minimum Capacity is Partition Capacity when weights are being enforced

# Partition Minimum Capacity Comparison Report



**Partition Capacity Comparison**

**Partition Capacity Comparison Report**
**Based on Partition Minimum Capacity**
Study ID: Sample zPCR Study
z10 2097-E26: ABC Production on IBM z9-EC
z196 2817-M15: Cloned from z10 2097-E40
Capacity basis: 2094-701 @ 593.00 MIPS for a shared single-partition configuration
Capacity for z/OS on z10 and later processors is represented with HiperDispatch turned ON

| Partition Identification List of All Included Partitions With Unique ID Metrics | | | | z10 2097-E26 #1 2097-E26/700: GP=10 zAAP=1 zIIP=1 IFL=2 ICF=1 | | | | | | z196 2817-M15 #3 2817-M15/700: GP=10 zAAP=1 zIIP=1 IFL=2 ICF=1 | | | | | | Full Capacity (MIPS) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Partition Definition | | | | | Minimum Capacity | Partition Definition | | | | | | Minimum Capacity | Net Change | % Delta |
| Type | Name | SCP | Workload | LP# | Mode | LCPs | Weight% | CAP | | LP# | Mode | LCPs | Weight | Weight% | CAP | | | |
| GP | LP-01 | z/OS-1.9* | Average | 1 | SHR | 10 | 53.23% | | 3,867 | 1 | SHR | 10 | 700 | 53.23% | ☐ | 5,407 | +1,540 | +39.8% |
| GP | LP-02 | z/OS-1.9* | Average | 2 | SHR | 6 | 30.42% | | 2,210 | 2 | SHR | 6 | 400 | 30.42% | ☐ | 3,107 | +897 | +40.6% |
| zAAP | LP-02 | z/OS-1.9* | Average | | SHR | 1 | 100.00% | | 778 | | SHR | 1 | 400 | 100.00% | ☐ | 1,090 | +312 | +40.1% |
| GP | LP-03 | z/OS-1.9* | Avg-High | 3 | SHR | 4 | 15.21% | | 1,030 | 3 | SHR | 4 | 200 | 15.21% | ☐ | 1,485 | +455 | +44.2% |
| zIIP | LP-03 | z/OS-1.9* | Avg-High | | SHR | 1 | 100.00% | | 751 | | SHR | 1 | 200 | 100.00% | ☐ | 1,072 | +321 | +42.7% |
| GP | LP-04 | z/VM | High/LV | 4 | SHR | 1 | 1.14% | ✔ | 75 | 4 | SHR | 1 | 15 | 1.14% | ☑ | 108 | +33 | +44.0% |
| IFL | LP-05 | Linux | Low/L | 5 | SHR | 2 | 88.89% | | 1,635 | 5 | SHR | 2 | 200 | 88.89% | ☐ | 2,087 | +452 | +27.6% |
| IFL | LP-06 | Linux | Low/L | 6 | SHR | 1 | 11.11% | | 204 | 6 | SHR | 1 | 25 | 11.11% | ☐ | 261 | +57 | +27.9% |
| ICF | LP-07 | CFCC | CFCC | 7 | DED | 1 | n/a | | 866 | 7 | DED | 1 | n/a | | 1,140 | +274 | +31.6% |

**Change Controls**

[ Commit Changes ]  [ Undo Changes ]  [ Optimize SHR LCPs ]

[ Consider Margin-of-Error ]

For significant configuration changes, capacity comparisons should be considered to have a +/-5% margin-of-error
Upgrading the processor family is considered a significant configuration change

Input fields have white background; Single-click a "selection field" for drop-down list; Double click a "key-in field" to open.

# zPCR Margin of Error

- **A new processor capacity expectation should normally be considered as having a margin of error of up to +5% or - 5%**

  - The full ±5% margin of error should be considered when:

    - The LPAR host processor family is changed

    - Very significant changes are made to the LPAR host CP configuration

    - Significant changes are made to the partition configuration

  - The margin of error is due to factors that include variability in workload/instruction mix and processor utilization

  - When changes are minor, the margin-of-error should be less

# Partition Capacity Comparison Report



Margin-of-Error

# Margin of Error Report



Partition Margin-of-Error

**Margin-of-Error Consideration**
**Partition Minimum Capacity**
Study ID: Sample zPCR Study
z10 2097-E26: ABC Production on IBM z9-EC
z196 2817-M15: Cloned from z10 2097-E40
**Capacity basis: 2094-701 @ 593.00 MIPS for a shared single-partition configuration**
**Capacity for z/OS on z10 and later processors is represented with HiperDispatch turned ON**

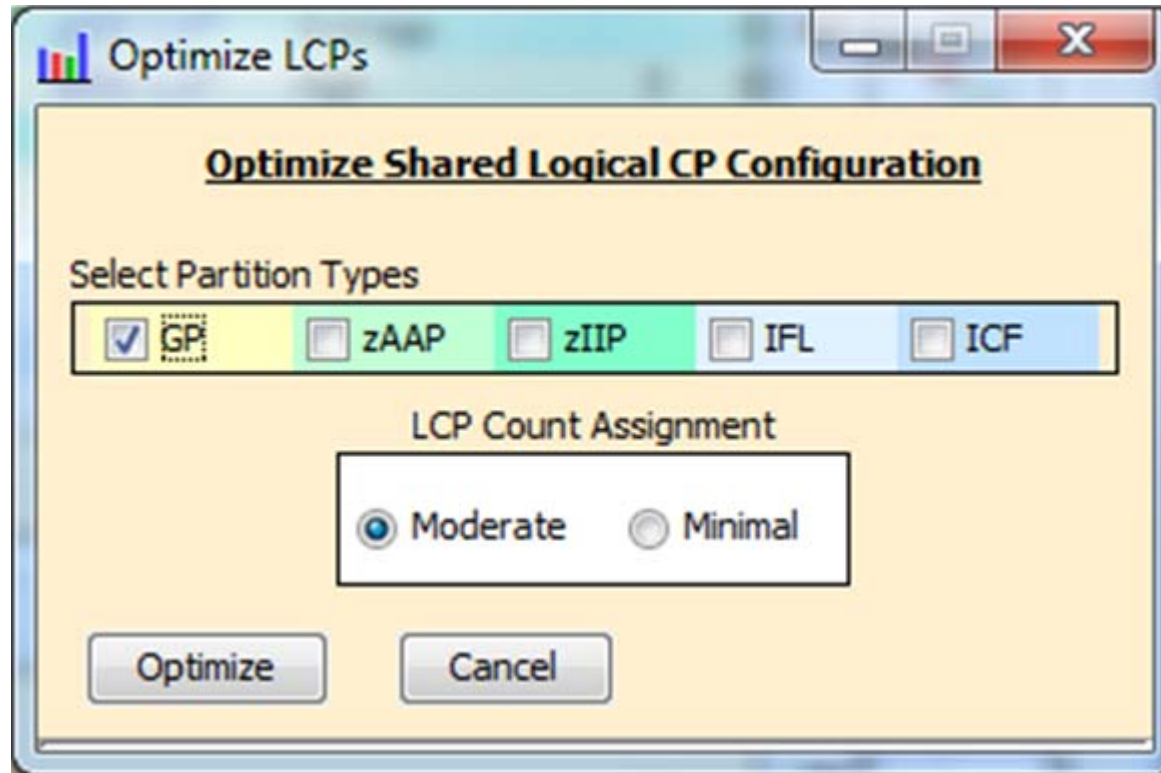| Partition Identification | | | | #1 z10 2097-E26 | #3 z196 2817-M15 | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| | | | | | Projected | | Projected minus 5% | |
| Type | Name | SCP | Workload | Projected Capacity | Capacity | % Delta | Capacity | % Delta |
| GP | LP-01 | z/OS-1.9* | Average | 3,867 | 5,407 | +39.8% | 5,136 | +32.8% |
| GP | LP-02 | z/OS-1.9* | Average | 2,210 | 3,107 | +40.6% | 2,952 | +33.6% |
| zAAP | LP-02 | z/OS-1.9* | Average | 778 | 1,090 | +40.1% | 1,035 | +33.0% |
| GP | LP-03 | z/OS-1.9* | Avg-High | 1,030 | 1,485 | +44.2% | 1,410 | +36.9% |
| zIIP | LP-03 | z/OS-1.9* | Avg-High | 751 | 1,072 | +42.7% | 1,019 | +35.7% |
| GP | LP-04 | z/VM | High/LV | 75 | 108 | +44.0% | 103 | +37.3% |
| IFL | LP-05 | Linux | Low/L | 1,635 | 2,087 | +27.6% | 1,982 | +21.2% |
| IFL | LP-06 | Linux | Low/L | 204 | 261 | +27.9% | 248 | +21.6% |
| ICF | LP-07 | CFCC | CFCC | 866 | 1,140 | +31.6% | 1,083 | +25.1% |

For significant configuration changes, capacity comparisons should be considered to have a +/-5% margin-of-error
Upgrading the processor family is considered a significant configuration change

# Optimize Shared Logical Processors

- **When migrating to a new processor evaluate the weights & logical processors needed**
  - If Hard Capping partitions, evaluate amount of capacity required to be guaranteed

- **Operating System impact on Logical Processors needs to be reviewed**

- **Level of optimization for LCP Count Assignment can be chosen as follows**
  - **Moderate**:
    - When the weight percent indicates number of logical CPs greater than or equal to 2.6
      - The exact number of logical CPs plus 1 (rounded up to the nearest whole number) will be assigned
    - When the weight percent indicates number of logical CPs should be less than 2.6
      - the exact number of logical CPs (rounded up to the nearest whole number) will be assigned
  - **Minimal**:
    - The weight percent is used to determine the exact number of logical CPs (rounded up to the nearest whole number) will be assigned

# Partition Capacity Comparison Report



**Partition Capacity Comparison**

## Partition Capacity Comparison Report
### Based on Partition Minimum Capacity
Study ID: Sample zPCR Study
z10 2097-E26: ABC Production on IBM z9-EC
z196 2817-M15: Cloned from z10 2097-E40
**Capacity basis: 2094-701 @ 593.00 MIPS for a shared single-partition configuration**
**Capacity for z/OS on z10 and later processors is represented with HiperDispatch turned ON**

| Partition Identification List of All Included Partitions With Unique ID Metrics | | | | #1 z10 2097-E26 2097-E26/700: GP=10 zAAP=1 zIIP=1 IFL=2 ICF=1 | | | | | | #3 z196 2817-M15 2817-M15/700: GP=10 zAAP=1 zIIP=1 IFL=2 ICF=1 | | | | | | Full Capacity (MIPS) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Partition Definition | | | | | Minimum Capacity | Partition Definition | | | | | Minimum Capacity | Net Change | % Delta |
| Type | Name | SCP | Workload | LP# | Mode | LCPs | Weight% | CAP | | LP# | Mode | LCPs | Weight | Weight% | CAP | | | |
| GP | LP-01 | z/OS-1.9* | Average | 1 | SHR | 10 | 53.23% | | 3,867 | 1 | SHR | 10 | 700 | 53.23% | ☐ | 5,407 | +1,540 | +39.8% |
| GP | LP-02 | z/OS-1.9* | Average | 2 | SHR | 6 | 30.42% | | 2,210 | 2 | SHR | 6 | 400 | 30.42% | ☐ | 3,107 | +897 | +40.6% |
| zAAP | LP-02 | z/OS-1.9* | Average | | SHR | 1 | 100.00% | | 778 | | SHR | 1 | 400 | 100.00% | ☐ | 1,090 | +312 | +40.1% |
| GP | LP-03 | z/OS-1.9* | Avg-High | 3 | SHR | 4 | 15.21% | | 1,030 | 3 | SHR | 4 | 200 | 15.21% | ☐ | 1,485 | +455 | +44.2% |
| zIIP | LP-03 | z/OS-1.9* | Avg-High | | SHR | 1 | 100.00% | | 751 | | SHR | 1 | 200 | 100.00% | ☐ | 1,072 | +321 | +42.7% |
| GP | LP-04 | z/VM | High/LV | 4 | SHR | 1 | 1.14% | ✔ | 75 | 4 | SHR | 1 | 15 | 1.14% | ☑ | 108 | +33 | +44.0% |
| IFL | LP-05 | Linux | Low/L | 5 | SHR | 2 | 88.89% | | 1,635 | 5 | SHR | 2 | 200 | 88.89% | ☐ | 2,087 | +452 | +27.6% |
| IFL | LP-06 | Linux | Low/L | 6 | SHR | 1 | 11.11% | | 204 | 6 | SHR | 1 | 25 | 11.11% | ☐ | 261 | +57 | +27.9% |
| ICF | LP-07 | CFCC | CFCC | 7 | DED | 1 | n/a | | 866 | 7 | DED | 1 | n/a | | ☐ | 1,140 | +274 | +31.6% |

**Change Controls**

| Commit Changes | Undo Changes | Optimize SHR LCPs |

Consider Margin-of-Error

For significant configuration changes, capacity comparisons should be considered to have a +/-5% margin-of-error
Upgrading the processor family is considered a significant configuration change

Input fields have white background; Single-click a "selection field" for drop-down list; Double click a "key-in field" to open.

"Optimize" SHR LCPs

# Optimize Share LCP Configuration

# Commit the Changes



**Partition Capacity Comparison**

### Partition Capacity Comparison Report
### Based on Partition Minimum Capacity
Study ID: Sample zPCR Study
z10 2097-E26: ABC Production on IBM z9-EC
z196 2817-M15: Cloned from z10 2097-E40
**Capacity basis: 2094-701 @ 593.00 MIPS for a shared single-partition configuration**
**Capacity for z/OS on z10 and later processors is represented with HiperDispatch turned ON**

| Partition Identification — List of All Included Partitions With Unique ID Metrics | | | | z10 2097-E26 #1 — 2097-E26/700: GP=10 zAAP=1 zIIP=1 IFL=2 ICF=1 | | | | | | z196 2817-M15 #3 — 2817-M15/700: GP=10 zAAP=1 zIIP=1 IFL=2 ICF=1 | | | | | | Full Capacity (MIPS) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Partition Definition | | | | | Minimum Capacity | Partition Definition | | | | | | Minimum Capacity | Net Change | % Delta |
| Type | Name | SCP | Workload | LP# | Mode | LCPs | Weight% | CAP | | LP# | Mode | LCPs | Weight | Weight% | CAP | | | |
| GP | LP-01 | z/OS-1.9* | Average | 1 | SHR | 10 | 53.23% | | 3,867 | 1 | SHR | 7 | 700 | 53.23% | ☐ | 5,566 | +1,699 | +43.9% |
| GP | LP-02 | z/OS-1.9* | Average | 2 | SHR | 6 | 30.42% | | 2,210 | 2 | SHR | 5 | 400 | 30.42% | ☐ | 3,154 | +944 | +42.7% |
| zAAP | LP-02 | z/OS-1.9* | Average | | SHR | 1 | 100.00% | | 778 | | SHR | 1 | 400 | 100.00% | ☐ | 1,106 | +328 | +42.2% |
| GP | LP-03 | z/OS-1.9* | Avg-High | 3 | SHR | 4 | 15.21% | | 1,030 | 3 | SHR | 2 | 200 | 15.21% | ☐ | 1,473 | +443 | +43.0% |
| zIIP | LP-03 | z/OS-1.9* | Avg-High | | SHR | 1 | 100.00% | | 751 | | SHR | 1 | 200 | 100.00% | ☐ | 1,112 | +361 | +48.1% |
| GP | LP-04 | z/VM | High/LV | 4 | SHR | 1 | 1.14% | ✔ | 75 | 4 | SHR | 1 | 15 | 1.14% | ☑ | 110 | +35 | +46.7% |
| IFL | LP-05 | Linux | Low/L | 5 | SHR | 2 | 88.89% | | 1,635 | 5 | SHR | 2 | 200 | 88.89% | ☐ | 2,088 | +453 | +27.7% |
| IFL | LP-06 | Linux | Low/L | 6 | SHR | 1 | 11.11% | | 204 | 6 | SHR | 1 | 25 | 11.11% | ☐ | 261 | +57 | +27.9% |
| ICF | LP-07 | CFCC | CFCC | 7 | DED | 1 | n/a | | 866 | 7 | DED | 1 | n/a | | ☐ | 1,140 | +274 | +31.6% |

**Change Controls**

[ Commit Changes ]  [ Undo Changes ]  [ Optimize SHR LCPs ]

For significant configuration changes, capacity comparisons should be considered to have a +/-5% margin-of-error
Upgrading the processor family is considered a significant configuration change

[ Consider Margin-of-Error ]

Input fields have white background;  Single click a "selection field" for drop-down list;  Double click a "key-in field" to open.

**Commit,  Undo Changes, or change by hand (any white area)**

# Show Host Capacity Summary

- Click on the **Host Capacity Summary** icon ⬜ to view the report.



Click Host Capacity Summary

# Host Capacity Summary

▪ For each defined LPAR configuration, its icon and name are provided, along with the processor model information and number of real CPs configured to each pool

   ▪ To display the description field of any LPAR configuration, place the mouse pointer anywhere on that row

▪ Click on the **Return** to take you back at the **Advanced-Mode Control Panel**



**Host Capacity Summary**

**LPAR Host Capacity Summary Report**
Study ID: Sample zPCR Study
Capacity basis: 2094-701 @ 593.00 MIPS for a shared single-partition configuration
Capacity for z/OS on z10 and later processors is represented with HiperDispatch turned ON

| LPAR Configuration | | Full CPC Capacity (based on usable RCP count) | | | | | |
|---|---|---|---|---|---|---|---|
| Identity | Hardware | GP | zAAP | zIIP | IFL | ICF | Total |
| #1 z10 2097-E26 | 2097-E26/700: GP=10 zAAP=1 zIIP=1 IFL=2 ICF=1 | 7,181 | 778 | 751 | 1,840 | 866 | 11,416 |
| #2 z10 2097-E40 | 2097-E26/700: GP=10 zAAP=1 zIIP=1 IFL=2 ICF=1 | 7,181 | 778 | 751 | 1,840 | 866 | 11,416 |
| #3 z196 2817-M15 | 2817-M15/700: GP=10 zAAP=1 zIIP=1 IFL=2 ICF=1 | 10,303 | 1,106 | 1,112 | 2,349 | 1,140 | 16,009 |

Content Control

☐ Show Capacity Deltas  ◉ Based on "z10 2097-E26"  ○ Incremental

Show capacity as

◉ Full CPC  ○ Single-CP

For significant configuration changes, capacity comparisons should be considered to have a +/-5% margin-of-error
Upgrading the processor family is considered a significant configuration change

Position mouse on LPAR configuration to display description

**Exit zPCR**

**Save Study**

# 3 Ways to Input Data into zPCR

- **1 – Manually**
  - For "what if" when no processor/system exists


- **2 – RMF**
  - When processor/system exists


- **3 - EDF File**
  - When processor/system exists
  - Recommended because of CPU MF input

# EDF Input for zPCR

## z/OS

Turn on CPU MF to start SMF 113 recording (primary partitions)

Post process SMF data with CP3KEXTR to produce EDF

| SMF datasets one per partition | CP3KEXTR runs on z/OS → | Creates EDF dataset one per partition on the host | Download the files to the PC → |
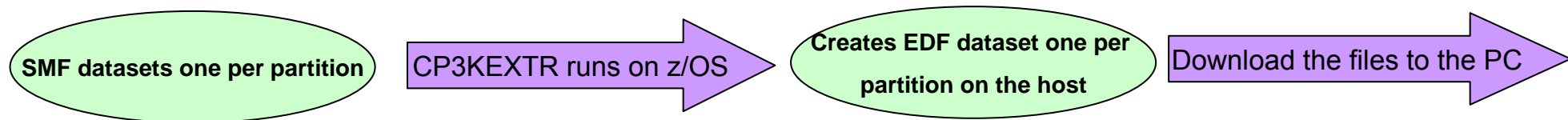
## z/VM

Enable Monitor to record CPU MF data (primary partitions)

Post process Monitor data with CP3KVMXT to produce EDF

| z/VM Monitor data per partition | CP3KVMXT runs on z/VM → | Creates EDF dataset one per partition on the host | Download the files to the PC → |
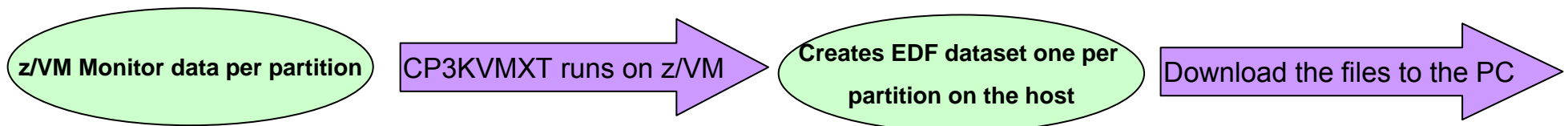
# z/OS EDF Input

<u>z/OS on System z</u>

Turn on CPU MF to start SMF 113 recording (primary partitions)

Post process SMF data with CP3KEXTR to produce EDF

Get zPCR CP3KEXTR here: http://www.ibm.com/support/techdocs/atsmastr.nsf/WebIndex/PRS4229

<u>Windows PC with zPCR installed</u>

Download EDF (1 per partition) to PC

In zPCR, Get Host and Partitions from EDF

Load EDF(s)

**Select (or drag) Processor Partitions simultaneously** ← **Gets CPU MF and Parked Engines for all partitions at the same time**

Select a representative interval

Show LPAR Host and its partition configuration

Create LPAR Configuration

Partitions with SMF 113s will assign "CPU MF" workload

SMF datasets one per partition → CP3KEXTR runs on z/OS → Creates EDF dataset one per partition on the host → Download the files to the PC
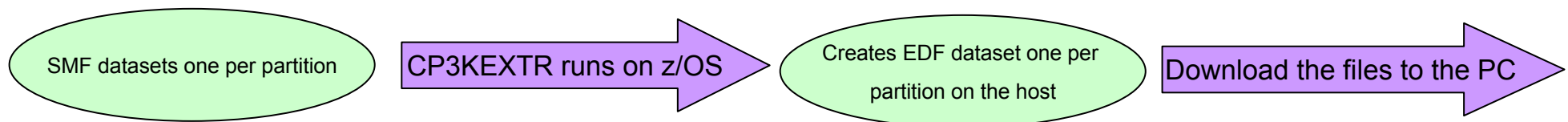
# Load the EDF files into zPCR

Get host and partitions from EDF file

# Load the EDF files into zPCR – Select an Interval

**Sort on GP Pool Utilization**

**Select an interval**

**EDF Interval Selection**

## EDF Intervals
### EDF File Name: I:\zpcr\Task 1.edf

| Relative Interval Number | CPC ID | GP Processor Model | Date | Time | Interval Length | Number of Active Partitions | Includes CPU-MF | Pool 1 GP Pool Utilization |
|---|---|---|---|---|---|---|---|---|
| 12. | CPC00001 | 2817-707 | 2012-09-15 | 10:44:00 | 00:15:00 | 8 | ✔ | 100.00% |
| 10. | CPC00001 | 2817-707 | 2012-09-15 | 10:14:00 | 00:15:00 | 8 | ✔ | 100.00% |
| 8. | CPC00001 | 2817-707 | 2012-09-15 | 09:44:00 | 00:15:00 | 8 | ✔ | 99.99% |
| 7. | CPC00001 | 2817-707 | 2012-09-15 | 09:29:00 | 00:15:00 | 8 | | 99.99% |
| 13. | CPC00001 | 2817-707 | 2012-09-15 | 10:59:00 | 00:15:00 | 8 | | 99.98% |
| 11. | CPC00001 | 2817-707 | 2012-09-15 | 10:29:00 | 00:15:00 | 8 | | 99.98% |
| 9. | CPC00001 | 2817-707 | 2012-09-15 | 09:59:00 | 00:15:00 | 8 | | 99.98% |
| 14. | CPC00001 | 2817-707 | 2012-09-15 | 11:14:00 | 00:15:00 | 8 | ✔ | 99.97% |
| 6. | CPC00001 | 2817-707 | 2012-09-15 | 09:14:00 | 00:15:00 | 8 | ✔ | 99.97% |
| 15. | CPC00001 | 2817-707 | 2012-09-15 | 11:29:00 | 00:15:00 | 8 | | 99.95% |

**Table View**

☐ Show All Pools    Number of intervals: 16

[Load EDF]  [Show Partitions]

Click on a row to select interval for which zPCR partition definitions are to be created

**CPU MF (SMF 113) data available**

# LPAR Configuration from EDF for Chosen Interval

**Create LPAR Configuration from EDF**

**Click "Create LPAR Configuration"**

### LPAR Configuration from EDF
z/OS SMF Data Set Name: ZPCRLAB.CPUMFSMF
Extract Version: CP3KEXTR11/16/12
EDF File Name: I:\zpcr\Task 1.edf
Interval #12: Date=2012-09-15 Time=10:44:00 Length=00:15:00
CPC ID: CPC00001; GP Processor Model = 2817-707
z196 Host = 2817-M15/700 with 7 CPs: GP=7

### Create Active Study
LPAR Host as specified above
Partition Configuration as specified below

| Create LP | LP is Active | LP from EDF | No. | Type | Name | SCP | Assigned Workload | Mode | LCPs | Weight | Weight % | CAP | Active | LCPs Parked | RNI | Workload Assignment | Method Used |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ✓ | ✓ | ✓ | 1 | GP | CICSA | z/OS-1.13 | Average | SHR | 7.0 | 340 | 34.0% | | ✓ | 4.0 | 0.88 | Average | CPU-MF |
| ✓ | ✓ | | 2 | GP | BATCHA | z/OS-1.13 | Average | SHR | 7.0 | 195 | 19.5% | | | | | | Default |
| ✓ | ✓ | | 3 | GP | BATCHB | z/OS-1.13 | Average | SHR | 2.0 | 32 | 3.2% | | | | | | Default |
| ✓ | ✓ | | 4 | GP | TESTB | z/OS-1.13 | Average | SHR | 2.0 | 12 | 1.2% | | | | | | Default |
| ✓ | ✓ | | 5 | GP | TESTIMS | z/OS-1.13 | Average | SHR | 5.0 | 36 | 3.6% | | | | | | Default |
| ✓ | ✓ | | 6 | GP | CICSB | z/OS-1.13 | Average | SHR | 7.0 | 297 | 29.7% | | | | | | Default |
| ✓ | ✓ | | 7 | GP | IMSA | z/OS-1.13 | Average | SHR | 5.0 | 73 | 7.3% | | | | | | Default |
| ✓ | ✓ | | 8 | GP | TESTCICS | z/OS-1.13 | Average | SHR | 2.0 | 15 | 1.5% | | | | | | Default |

Select All   Select Active   Remove All   Choose Another EDF Interval

☑ When copying partitions into zPCR remove Parked LCPs from the LCP Count

**Create LPAR Configuration**

Note: One or more partitions have "Parked" LCPs. The LCP count for HiperDispatch partitions should be reduced by the number of "Parked" LCPs

Click on "Copy LP" checkbox to select partitions to be copied to the active study

# Output Options

- **Types**
  - CSV
  - HTML

- **Processed by**
  - Spreadsheets (HTML and CSV)
  - Word Processors (HTML)
  - Browsers (HTML)

# Output Results



Output to HTML file

Output to CSV file

# Single Spot on the Web to Get More Information

- zPCR Getting Started Page
  **http://www.ibm.com/support/techdocs/atsmastr.nsf/WebIndex/PRS1381**

  - Contains:
    - Downloadable Code
    - zPCR Users Guide
    - External File Layout documentation
    - Links to both CP3KEXTR and CP3KVMXT
    - Link to enabling CPU MF information

  - Technical Support Information
    - Training materials in .avi format (voice over foils)
    - zPCR Demonstration
      - 5 sections (wmv files)
        - Fundamentals
        - LPAR planning (basic and Advanced mode)
    - Education Exercises
      - 1 Advanced Mode Exercise for z10 to z196
    - Special Notices and FAQs

- **Q&A and defect support are available through email:** **zpcr@us.ibm.com**

# Techdocs provides the latest ATS technical collateral
## www.ibm.com/support/techdocs

# System z Social Media

- **System z official Twitter handle:**
  - ► **@ibm_system_z**

- **Top Facebook pages related to System z:**
  - ► **Systemz Mainframe**
  - ► **IBM System z on Campus**
  - ► **IBM Mainframe Professionals**
  - ► **Millennial Mainframer**

- **Top LinkedIn Groups related to System z:**
  - ► **Mainframe Experts Network**
  - ► **Mainframe**
  - ► **IBM Mainframe**
  - ► **System z Advocates**
  - ► **Cloud Mainframe Computing**

- **YouTube**
- ► **IBM System z**

- **Leading Blogs related to System z:**
  - ► **Evangelizing Mainframe (Destination z blog)**
  - ► **Mainframe Performance Topics**
  - ► **Common Sense**
  - ► **Enterprise Class Innovation: System z perspectives**
  - ► **Mainframe**
  - ► **MainframeZone**
  - ► **Smarter Computing Blog**
  - ► **Millennial Mainframer**

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# Summary

- **zPCR models <u>your unique</u> Processor configuration**
  - Based on LPARS, weights, # of logical processors, workload mix and Specialty Engines

- **Built upon LSPR benchmarks**

- **Using zPCR is Easy**

- **Use zPCR to correctly size your processor**

It's QUESTION TIME !!
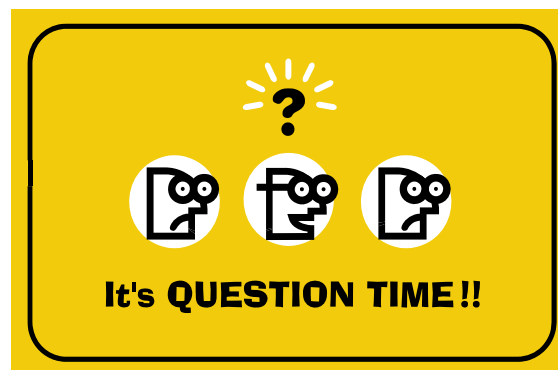
# Back Up

# Acknowledgements

- **Many people contributed to this presentation including:**

  John Fitch

  Gary King

  Jim Shaw

  Brad Snyder

  John Burg

  Kathy Walsh

# What is new in zPCR V8.4…

- The **IBM zEnterprise BC12** (**zBC12**) processor family has been added. A maximum of 6 CPs on the 2828-H06 and 13 CPs on the 2828-H13 can be configured. Up to 6 General Purpose CPs can be configured, with any of 26 possible speed settings (156 capacity settings). Remaining CPs can be configured as zAAP, zIIP, IFL, or ICF CPs, which are always full speed engines.

- The IBM zBC12 models can be viewed in both the *Multi-Image* (both GP and IFL) and the *Single-Image* (GP only) *LSPR tables*, and can be defined as the LPAR host processor in the *LPAR Configuration Capacity Planning* function.

- LSPR ITR data continues to be based on z/OS-1.13. LSPR capacity data for all previous processor families remains unchanged.

# What is new in zPCR V8.4 continued…

- **Function, algorithms, and metrics remain identical to that of zPCR v8.2c, with the following exceptions:**

    - Metrics for the new *zBC12* have been added

    - *LPAR Configuration Capacity Planning* function: Corrected the following problem:

        - When configuring partitions on the z114 2818-V0x, and any partition has a GP+zAAP or GP+zIIP logical CP count greater than 5, capacity results were inaccurate. Studies previously done for this model should be redone with PCR v8.4 or later.

- Support for z/OS partitions has been updated to allow up to 100 logical CPs to be defined on a zEC12. The previous limit of 99 was not correct.

# zPCR Capacity Sizing Lab – Part 2 Hands-on Lab

**SHARE - Session 13954**

August 15, 2013

**John Burg**

**Brad Snyder**

**IBM**

# Agenda

- Lab Exercise Introduction

- Lab Exercise

# Overview of Lab Exercise

- **XYZ Corporation Background**

  - Currently has System z196
    - 2817-707 (7 way GCPs)
    - Customer views it as having 7,127 MIPS from last zPCR
    - Machine averages 100% busy during peak

- **Plan being developed to replace with zEC12**

  - Must have at least 20%+ additional capacity
    - at least 8,553 MIPS
  - Prefer a 2827-7xx but would consider a sub-capacity 2827-6xx

# Lab Exercise – Tasks to Complete

- Task 1 – Load EDF containing the latest RMF/SMF data
  - Including SMF 113s
- Task 2 – Rename the configuration
- Task 3 - Save the current study in Advanced-Mode
  - e.g. task2.zpcr
- Task 4 - Find an appropriate zEC12 700 replacement processor
- Task 5 - Model the intended zEC12 LPAR host using Advanced Mode
- Task 6 - Review the Capacity results and save the Study
  - Use a different file name than Task 3, e.g. task6.zpcr


- Additional Analysis To Try
  - A. Model a zEC12 600 as an alternative
  - B. Add 1 IFL partition running Linux for System z under z/VM to zEC12 700

*The purpose of this lab is to enable familiarization and skill in executing zPCR*
*Advanced Mode, and it may not necessarily reflect capacity sizing best practices*