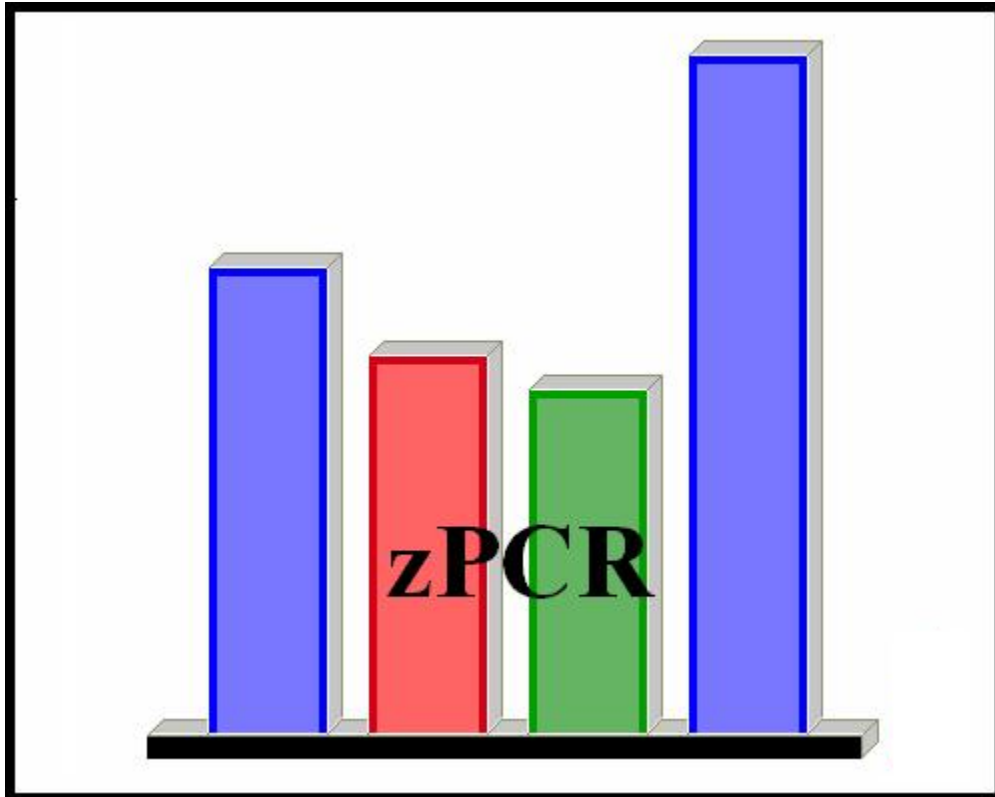# zPCR

Processor Capacity Reference for IBM System z

External Study File Layout

Version 7.1 and Later

zPCR External Study File Layout 2010c04.doc

July 26, 2010

Introduction

zPCR is a PC-based productivity tool under Windows, designed to provide capacity planning insight for IBM System z processors running various workload environments under z/OS, z/VM, and Linux. Capacity results are based on IBM's **LSPR** data. In addition to the current z/OS-1.9, Linux and z/VM data is provided. Also included are tables with many of the older S/390 processors.

Capacity is presented relative to a user-selected Reference-CPU, which may be assigned any capacity scaling factor and metric. Function in **zPCR** includes:

1. **LSPR Processor Capacity Tables**: Displays processor capacity ratios for up to 10 SCP/workload environments. Specific workloads and the order presented is user controlled. Capacity tables provided include:

   - **Multi-image:** Each processor has a partition configuration typical for the model. All partitions are assumed to be running the same z/OS workload (General Purpose CPs only).

   - **Single-image**: Each processor has a single shared partition with all CPs assigned (maximum = that supported by the SCP). Separate tables are available for each set of LSPR data. A special combined table allows direct comparisons of many IBM System z processors to the older S/390 processors.

2. **LPAR Configuration Capacity Planning:** Any specific LPAR configuration can be defined. Capacity projections are generated for each partition as well as the LPAR host as a whole. The LPAR host processor can be configured with General purpose CPs, zAAPs, zIIPs, IFLs, and ICFs where valid. Partitions are defined, specifying type (General Purpose, IFL, or ICF), SCP/workload, and LP configuration (dedicated/shared with number of logical CPs), and weight/capping assignments zAAPs and zIIPs are always associated a General Purpose partition. Partition configurations can be created directly from MVS RMF data or from previous **zPCR** studies.

Results are presented in tables and graphs and can be easily captured for notes, presentations, or handouts. A complete study can be saved for future reference. A User's Guide, integrated online help, and relevant documentation are included.

The most useful aspect of **zPCR** is (#2 above) the ability to model any legitimate LPAR configuration and produce capacity results for it by partition or for the complex as a whole. Both the LPAR configuration of a currently installed IBM System z processor, and the LPAR configuration for an intended processor upgrade can be modeled; results can then be compared to determine the expected capacity delta for the upgrade.

Each **zPCR** analysis can be captured as a **zPCR** "***study file***", which can be used subsequently to restore the study at any time.

When large numbers of partitions are being exploited, it can become tedious to enter all of the pertinent partition definition information into **zPCR** manually. z/OS can capture the current partition definition information as SMF (System Monitoring Facility) data. Performance monitoring tools such as RMF can then create various reports. **zPCR** has the ability to read RMF reports, directly porting the partition definitions.

Other products also exist that can read SMF data and produce similar reports. This guide is intended to document a method through which partition definitions could be created automatically by such products or user written code. The file is an XML file with various tags that look similar to a **zPCR** study file. The tags are used to identify all the aspects of the LPAR host and its partitions to **zPCR**.

Overview

The **_zPCR External Study File_** is a file that can be loaded into **zPCR**. It is intended to provide definitions for the LPAR host and each of the defined or active partitions. The file consists of the following primary XML tags:

\<ExternalSource>	Describes the version and the source of the configuration data. This tag is required.
\<Host>	Describes the LPAR host processor configuration. This tag is required.
\<GeneralPurpose>	Used to describe each General Purpose partition.
\<zAAP>	Used to describe each set of zAAP logical CPs associated with a General Purpose partition that is running z/OS.
\<zIIP>	Used to describe each set of zIIP logical CPs associated with a General Purpose partition that is running z/OS.
\<IFL>	Used to describe each IFL partition.
\<ICF>	Used to describe each ICF partition.

It is suggested that the file extension used for a **zPCR _External Study File_** be "**zpcr**". With this file extension assigned, it can be used as any normal study file to start **zPCR**, or when using **_drag and drop_** techniques to populate an LPAR configuration.

The tags discussed in this document are supported by **zPCR** v6.0 or later.

Certain metrics, which are not defined in the **zPCR _External Study File_**, are set to the **zPCR** default value or the user's preferences value loaded at startup. Definitions for these metrics can be manually changed by the end user at any time within a **zPCR** invocation.

- **MI Reference-CPU** model, its scaling-factor and scaling-metric
- **SI Reference-CPU** model, its scaling-factor and scaling-metric
- **User Workload Mix** definitions

In addition, any metric defined via the **zPCR _External Study File_** can be changed during a **zPCR** invocation.

The LPAR host defined in the **zPCR _External Study File_** is limited to z9 and later processor models (i.e. z9 and z10; both EC and BC). Only the SCP versions included with **zPCR** can be supported. When loaded, any z/OS version found that is not supported in **zPCR** is translated to an appropriate one that is supported. Note that for z10 processors, z/OS-1.8 or later must be specified.

For z/OS partitions, the **zPCR** workload mix assigned is based on the partitions I/O rate and utilization. If either of these values is not specified, the workload will be set to "Unknown", and the user will have to choose one from **zPCR** itself. For z/VM, Linux, z/VSE and CFCC, the workload is set to a fixed value which can be changed by the user.

Nearly any valid LPAR configuration is allowed, with the following exceptions:

- GP and IFL partitions running z/VM are limited to 32 logical CPs.
- IFL partitions running Linux are limited to 32 logical CPs.
- ICF partitions are always limited to 16 logical CPs, since the hardware is limited to 16 real ICFs.

Upon reading the External study file, any errors found will be placed in a file called "**configuration.errors**". This file is intended to help identify the items that need to be corrected.

The primary tags and their various supporting tags are documented below.

A sample **zPCR** *External Study File* in the format required is provided at the end.

Tag Descriptions

<ExternalSource>

This tag identifies the **zPCR** External File version and the configuration data source.

Tag Identifier	Description	Required	Possible values
<Version>	Identifies the file layout "version"	Yes	1. 0
<Company>	Company Name / Product Name	Optional	
<SMFFileName>	Name of the SMF file the data originated from	Optional	
<SMFOrigin>	Date and time of the SMF data	Optional	

<StudyID>

This tag provides text identifier for the study.

Tag Identifier	Description	Required	Possible values
<Name>	Study Identification information (50 character maximum)	Optional	

<Host>

This tag is used to define the LPAR host processor model and its CP configuration

Tag Identifier	Description	Required	Possible values	Comments
<Name>	Machine/Type model	Yes	Examples: **2094-701** or **2094-S08**	Only 2094, 2096, 2097 and 2098 are supported
<GeneralPurposeCPs>	Number of General Purpose CPs installed	Yes	0 or the minimum allowed to maximum allowed by the hardware	At least one of the fields listed (GP, zAAP, zIIP, IFL, or ICF) must be specified with a value greater than 0
<zAAPCPs>	Number of zAAPs installed	Yes	0 to maximum allowed by the hardware	
<zIIPCPs>	Number of zIIPs installed	Yes	0 to maximum allowed by the hardware	
<IFLCPs>	Number of IFLs installed	Yes	0 to maximum allowed by the hardware	
<ICFCPs>	Number of ICFs installed	Yes	0 to maximum allowed by the hardware	

<GeneralPurpose>

This tag is used to define each General Purpose partition

Tag Identifier	Description	Required	Possible values	Comments
<Name>	Partition name	Yes	1-8 characters	Name must be unique for GP partitions
<Type>	Type of partition: Dedicated/Shared	Yes	**DED** or **SHR**	Defaults to SHR if not specified
<SCP>	SCP running in the partition	Yes	**z/OS V1R4**, **z/OS V1R5**, **z/OS V1R6**, **z/OS V1R7**, **z/OS V1R8**, **z/OS V1R9**, **z/OS V1R10**, **z/VM**, **Linux**, **z/VSE**, or **CFCC**	Some z/OS versions will be converted to an appropriate one that is supported by zPCR
<LCPs>	Number of logical CPs	Yes	1 – maximum number of General Purpose CPs defined to the LPAR host	
<Weight>	Weight assigned	Shared partitions only	1-1000	Ignored for dedicated partitions
<Cap>	Partition is capped	Yes	**True/False**	
<DASDIORate>	DASD I/O per second	Optional	0 or greater	For SCP = z/OS only, these two tags are used in conjunction to determine the z/OS workload mix to be assigned to the partition. Workload will default to "Unknown if either field is not specified
<Utilization>	Utilization	Optional	0. 0 – 100. 0	
				For other SCPs, a specific fixed workload is assigned.
<Include>	Include checkbox	Yes	**True/False**	Default = False

The **<General Purpose>** tags below are specific to SMF 113 data when obtained for a partition on a z10 processor.

Tag Identifier	Description	Required	Possible values	Comments
<L1MP>	Level 1 cache miss percent	Optional	0 to 100%	These tags are used to generate the *113 Hint* for the workload category to be assigned to the z10 partition
<MEMP>	Percent of time memory had to be accessed	Optional; If provided, missing tags will be considered as being zero	0 to 100%; the sum of these must not exceed 100%	
<L2LP>	Percent of time the Level 2 local cache had to be accessed			
<L2RP>	Percent of time the Level 2 remote cache had to be accessed			

The **<General Purpose>** tags below are specific to SMF 113 data when obtained for a partition on a z196 processor.

Tag Identifier	Description	Required	Possible values	Comments
<L1MP>	Level 1 cache miss percent	Optional; Required if SMF 113 data is to be considered	0 to 100%	These tags are used to generate the *113 Hint* for the workload category to be assigned to the z196 partition
<MEMP>	Percent of time memory had to be accessed	Optional; If provided, missing tags will be considered as being zero	0 to 100%; the sum of these must not exceed 100%	
<L3P>	Level 3 cache percent			
<L4LP>	Level 4 cache local percent			
<L4RP>	Level 4 cache remote percent			

<zAAP>

This tag is used to define each set of zAAP logical CPs that are associated with a single General Purpose partition. All tags not specified here are inherited from the General Purpose partition.

Tag Identifier	Description	Required	Possible values
<Name>	Partition name	Yes	1-8 characters; Must be identical to that of the associated GP partition running z/OS
<LCPs>	Number of zAAP logical CPs assigned to the partition	Yes	1 – maximum number of zIIP CPs or zAAP CPs defined to the host above
<Weight>	Weight assigned	Shared partitions only	1-1000
<Cap>	Partition is capped		**True/False**

<zIIP>

This tag is used to define each set of zIIP logical CPs that are associated with a single General Purpose partition. All tags not specified here are inherited from the General Purpose partition.

Tag Identifier	Description	Required	Possible values
<Name>	Partition name	Yes	1-8 alphameric characters; Must be identical to that of the associated GP partition running z/OS
<LCPs>	Number of zIIP logical CPs assigned to the partition	Yes	1 – maximum number of zIIP CPs or zIIP CPs defined to the host above
<Weight>	Weight assigned	Shared partitions only	1-1000
<Cap>	Partition is capped		**True/False**

<IFL>

The following table describes the tags required to define an IFL partition.

Tag Identifier	Description	Required	Possible values
<Name>	Partition name	Optional	1-8 alphameric characters
<Type>	Type of partition: Dedicated/Shared	Yes	**DED** or **SHR**
<SCP>	SCP running in the partition	Yes	**z/VM** or **Linux**
<LCPs>	Number of logical CPs assigned	Yes	1–16; Limited to number of ICF CPs defined to the host above
<Weight>	Weight assigned	Shared partitions only	1-1000
<Cap>	Partition is capped		**True/False**
<Include>	Include checkbox	Yes	**True/False**

<ICF>

The following table describes the tags to define each ICF partition

Tag Identifier	Description	Required	Possible values
<Name>	Partition name	Optional	1-8 alphameric characters
<Type>	Type of partition: Dedicated/Shared	Yes	**DED** or **SHR**
<LCPs>	Number of logical CPs assigned	Yes	1–16; Limited to number of ICF CPs defined to the host above
<Weight>	Weight assigned	Shared partitions only	1-1000
<Cap>	Partition is capped		**True/False**
<Include>	Include checkbox	Yes	**True/False**

Sample ESF

```
<?xml version="1.0" ?>
<zPCR xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
          xsi:noNamespaceSchemaLocation="zPCR.xsd">

   <!-- Sample Comments -->

   <ExternalSource>
      <Version>1.0</Version>
      <Vendor>XYZ Corp.</Vendor>
      <SMFFileName>SampleSMF</SMFFileName>
      <SMFOrigin>05/22/2008 10:20</SMFOrigin>
   </ExternalSource>
   <StudyID>
      <Name>XYZ Enterprises</Name>
   </StudyID>
<!-- Host specified with 2096 model -->
   <Host>
      <Name>2098-J03</Name>
      <GeneralPurposeCPs>4</GeneralPurposeCPs>
      <zAAPCPs>1</zAAPCPs>
      <zIIPCPs>1</zIIPCPs>
      <IFLCPs>1</IFLCPs>
      <ICFCPs>0</ICFCPs>
   </Host>
   <GeneralPurpose>
      <Name>LP-01</Name>
      <SCP>z/OS V1R10</SCP>
      <Type>SHR</Type>
      <LCPs>4</LCPs>
      <Weight>100</Weight>
      <Cap>false</Cap>
      <DASDIORate>6.0</DASDIORate>
      <Utilization>50.0</Utilization>
      <Include>true</Include>
      <L1MP>2.5</L1MP>
      <MEMP>2.3</MEMP>
      <L2LP>13.3</L2LP>
```

```
        <L2RP>0.4</L2RP>
      </GeneralPurpose>
  <!-- Only valid zAPP tags all the others are inherited from associated GP partition -->
    <zAAP>
        <Name>LP-01</Name>
        <LCPs>1</LCPs>
        <Weight>999</Weight>
        <Cap>false</Cap>
    </zAAP>
  <!-- Only valid zIIP tags all the others are inherited from associated GP partition -->
    <zIIP>
        <Name>LP-02</Name>
        <LCPs>1</LCPs>
        <Weight>999</Weight>
        <Cap>false</Cap>
    </zIIP>
    <GeneralPurpose>
        <Name>LP-02</Name>
        <SCP>z/OS V1R11</SCP>
        <Type>SHR</Type>
        <LCPs>4</LCPs>
        <Weight>100</Weight>
        <Cap>false</Cap>
        <DASDIORate>500.0</DASDIORate>
        <Utilization>90.0</Utilization>
        <Include>true</Include>
      </GeneralPurpose>
  <!-- Sample GP with no DASDIO Rate & Utilization specified-->
  <!-- Note Workload defaults to "unknown" -->
    <GeneralPurpose>
        <Name>LP-03</Name>
        <SCP>z/OS V1R9</SCP>
        <Type>SHR</Type>
        <LCPs>1</LCPs>
        <Weight>100</Weight>
        <Cap>false</Cap>
        <Include>true</Include>
      </GeneralPurpose>
  <!-- Sample GP with no DASDIO Rate & Utilization specified-->
  <!-- Note Workload defaults to "unknown" -->
```

```
  <GeneralPurpose>
    <Name>LP-06</Name>
    <SCP>z/OS V1R11</SCP>
    <Type>SHR</Type>
    <LCPs>4</LCPs>
    <Weight>100</Weight>
    <Cap>false</Cap>
    <Include>true</Include>
  </GeneralPurpose>
<!-- Sample GP with zero DASDIO Rate & Utilization -->
<!-- Note Workload defaults to "unknown" -->
  <GeneralPurpose>
    <Name>LP-07</Name>
    <SCP>z/OS V1R11</SCP>
    <Type>SHR</Type>
    <LCPs>4</LCPs>
    <Weight>100</Weight>
    <Cap>false</Cap>
    <DASDIORate>0.0</DASDIORate>
    <Utilization>0.0</Utilization>
    <Include>true</Include>
  </GeneralPurpose>
  <GeneralPurpose>
    <Name>LP-08</Name>
    <SCP>z/OS V1R11</SCP>
    <Type>SHR</Type>
    <LCPs>4</LCPs>
    <Weight>100</Weight>
    <Cap>false</Cap>
    <DASDIORate>500.0</DASDIORate>
    <Utilization>80.0</Utilization>
    <Include>true</Include>
  </GeneralPurpose>
<!-- Sample GP with "z/VSE" SCP -->
  <GeneralPurpose>
    <Name>LP-08</Name>
    <SCP>z/VSE</SCP>
    <Type>SHR</Type>
    <LCPs>4</LCPs>
    <Weight>100</Weight>
```

```
      <Cap>false</Cap>
      <Include>true</Include>
   </GeneralPurpose>
<!-- Sample IFL with "z/VM" SCP -->
   <IFL>
      <Name>LP-09</Name>
      <SCP>z/VM</SCP>
      <Type>SHR</Type>
      <LCPs>4</LCPs>
      <Weight>100</Weight>
      <Cap>false</Cap>
      <Include>true</Include>
   </IFL>
<!-- Sample IFL with "Linux" SCP -->
   <IFL>
      <Name>LP-10</Name>
      <SCP>Linux</SCP>
      <Type>SHR</Type>
      <LCPs>1</LCPs>
      <Weight>100</Weight>
      <Cap>false</Cap>
      <Include>true</Include>
   </IFL>
</zPCR>
```