The LPARDesign and LPARDesign Extended Tools

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GUIDE Share France

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AGENDA

- ✓ PART-1
  - ❑ Background of HiperDistpatch® - Purpose of the Tool – Why the Tool ?
  - ❑ HiperDispatch® Overview
  - ❑ LPARDesign Tool demo and explanations

- ✓ PART-2
  - ❑ LPARDesign Extended Tool

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PURPOSE OF THE TOOL – WHY THE TOOL

✓ Background of HiperDispatch®
- HiperDispatch® was announced with the z10
- No actual IBM presentation / actual explanation / Tool for this feature were available
  - The z10 HiperDispatch® presentation was ……………… funny

✓ Purpose of the Tool
- Ease the LPAR configuration
- Provide optimizations of the LPAR configuration
- Provide visualization of the LPAR configuration

✓ Why the Tool?
- HiperDispatch® needs some calculations to have the spread of the Vertical LPs
- The calculations are sometimes different depending on the machine type
- The Tool makes all the calculations for you
- The Tool can "talk" to zPCR, so can be part of the IBM sizing methodology.
  - *You can generate a zPCR Study*
  - *You can generate an .XML configuration definition to be read by LPARDesign Extended*

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HiperDispatch® Overview

Hiperdispatch®: Motivation

- Design Objective
  - Keep work as much as possible local to a physical processor to optimize the usage of the processor caches
  - Expected Result
    - Cache reloads shall occur much less often
    - Cache misses and fetches from other books (and chips) should be avoided as much as possible

- Function: Hiperdispatch®
  - Interaction between z/OS and PR/SM to optimize work unit and logical processor placement to physical processors
  - Consists of 2 parts
    - In z/OS (sometimes referred as **Dispatcher Affinity**)
      → Because it attempts to create a temporary affinity between work and processors

    - In PR/SM (sometimes referred as **Vertical CPU Management**)
      → Because it attempts to assign physical processors exclusively to logical processors (as much as possible)

$$\textbf{Workunit}_x \quad \mathscr{R} \quad \textbf{LogProc}_y \quad \mathscr{R} \quad \textbf{PhysProc}_z$$

x, y, z constants

z/OS ← → PR/SM

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- OPTIMIZING THE NUMBER OF LOGICAL PROCESSORS DOWN TO THE MINIMUM NUMBER NEEDED OF PHYSICAL PROCESSORS
  - –Based on the Share of the logical partition
    - 1 – Compute the %Share of the LPAR

$$\%\text{Share}(\text{LPAR}i) = \frac{\text{Weight}(\text{LPAR}i)}{\sum_{j=1}^{n} \text{Weight}(\text{LPAR}j)}$$

  2 – Compute the Guaranteed number of PP this LPAR is entitled to

$$\#\text{PP}(\text{LPAR}i) = \%\text{Share}(\text{LPAR}i) * \text{Total\_\#PP\_of\_Shared\_Pool} = \textbf{N.M}$$

- **Compute Result = N.M ➜ Number of PP guaranteed to the LPAR**
    - **N** = number of physical processors which can be **used completely** by this partition
    - **M** = the **fraction of a physical processor** which must be used to satisfy the share of the partition

PR/SM® - LP Entitlement with HiperDispatch®

- **Example – A Machine with 5 PP**
  - Assignment of logical processors to physical processors in HiperDispatch® mode
  - LPAR1 – **N=3**, **M=0.5**
    - 3 physical processors (High Processors)
    - Share of 50% of the 4th processor (Medium Processor)
  - LPAR2 – **N=1**, **M=0.5**
    - 1 physical processor (High Processors)
    - Share of 50% of the 2nd processor

- **What about the "others" Logical Processors?**
  - **1** for LPAR1 and **3** for LPAR2
    - Low Processors (parked = not used)
  - If demand exists AND the other partition does not need their share
    - Medium processors can use up to all of their physical processors
    - Low processors can be un-parked and start to use physical processors which are not needed by other partitions

Partition	LPs	Weight	Share	Share in PPs
LPAR1	5	350	70%	3.5
LPAR2	5	150	30%	1.5
		500		5

New wording with HiperDispatch®

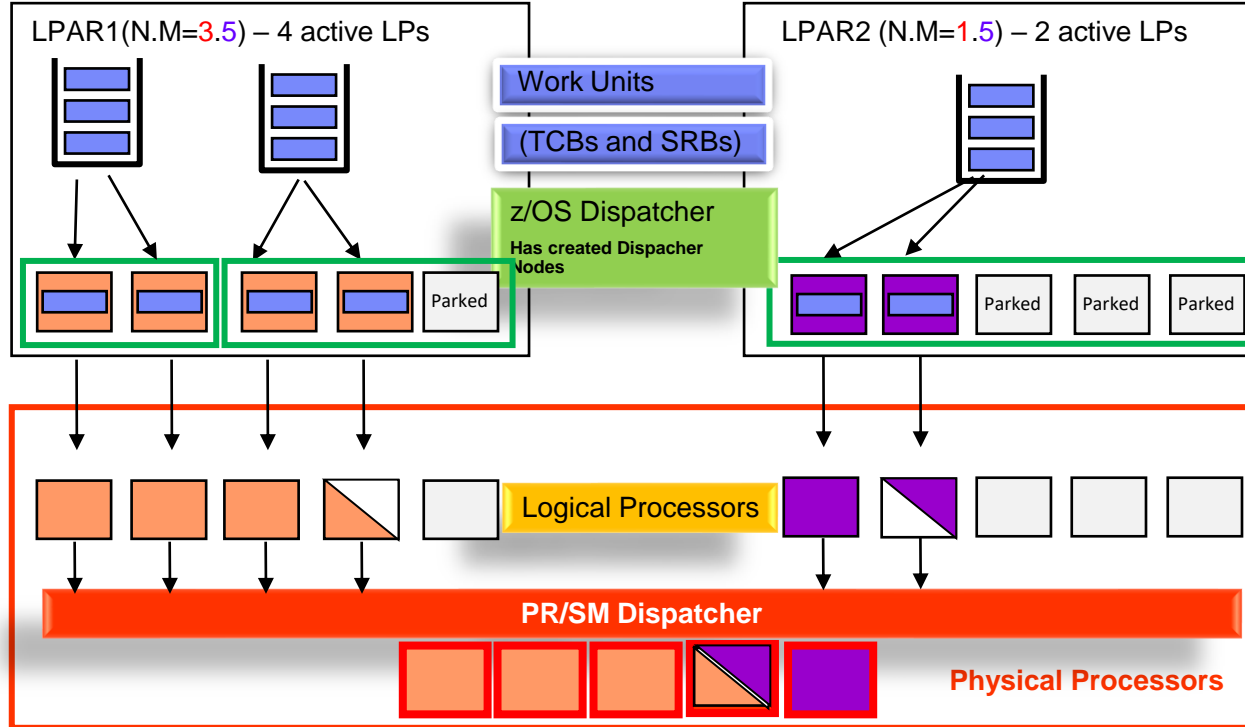Vertical High   **VH**
  - uses 100% of a PP
Vertical Medium   **VM**
  - uses 1-99% of a PP (100% in specific cases)
Vertical Low   **VL**
  - can be "Unparked" if demand exists and thus joins the VM pool

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Dispatching in a z/OS and PR/SM environment **(W/HD)**

Hiperdispatch : PR/SM® - What has changed in z14 and z15 vs z13

- **LP Spread Computing**

Case#	Specify Machine from the list	Type	Specify N.M	Specify #LP		#VH	#VM	VM%	#VL	#Active	Comments
1	8561	z15	1.50	2	GO!	1	1	50.00%	0	2	
2	3906	z14	1.50	2	GO!	1	1	50.00%	0	2	
3	2964	z13	1.50	2	GO!	0	2	75.00%	0	2	z13,z13s Rule even if M>=0.5

The HiperDispatch® formula

The Basic HiperDispatch® Equation

Compute Result = N.M ➜ Number of Physical Procs. guaranteed to the LPAR

- **N** = number of physical processors which can be **used completely** by this LPAR
- **M** = the **fraction of a physical processor** which must be used to satisfy the share of the LPAR

$$N.M = \#PP * \%SHARE$$

Number of Physical Processor
May change after:
- ON/OFF
- Adding an LPAR with DED Procs.

%Share – May change after:
- Adding a new LPAR
- Deleting an LPAR
- Changing the Weight of a LPAR
- Soft Capping with positive Phantom Weight

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Hiperdispatch® : PR/SM part .. – LP entitlements – #LP rules

Do not worry !!!!! All these rules and calculations are done for you in the **LPARDesign Tool**

ID=IBM Corp. - LPARDesign V11-T03 Current zPCR Version-9.4b - SpecCfg=YES

This macro evaluates the LPAR definition for HD eligible processors

To create a copy of this spreadsheet   Create a copy...   *Optional but recommended*

To start

Accept SPECIAL ConF ?   **YES**

Change Customer Name / ID

2 - Change Configuration

Machine-Type	8561-718
#zIIP	18
#ICF	18
#IFL	18

==> *Not HD Eligible*

To save results   =======>   Save as...

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DISCLAIMER OF WARRANTIES:
The following [enclosed] macro is sample code created by *Alain Maneville - IBM France.*
This sample macro is not part of any standard IBM product and is provided to you solely for the purpose of assisting you in the PR/SM LPAR Configuration
The code is provided "AS IS", without warranty of any kind. IBM shall not be liable for any damages arising out of your use of such sample code,
even if you have been advised of the possibility of such damage.
The DASHBOARD-HD code and the zPCR code have been written by *Thierry Deleris (a customer from BPCE-IT)*
The CONFIG-MSU code has been written by *Robert Vaupel - IBM (STSM, z/OS Workload and Performance Management)*
Support : Support will be provided on a "best effort" basis. Send the spreadsheet for an analysis to **alain_maneville@fr.ibm.com**

LparDesign

Minimize/Maximize

Go To Start

GCP	✓	ⓘ	🔍	📊
zIIP	✓	ⓘ	🔍	📊
IFL	✓	ⓘ	🔍	📊
ICF	✓	ⓘ	🔍	📊

Go To MSU

Go To Dashboard

Go To Expert

zPCR Menu

XML Menu

Print

Configuration

Model	8561-718	☐
zIIP	18	☐
IFL	18	☐
ICF	18	☐

First Worksheet – Defining the configuration, and some parameters.

ID=IBM Corp. - LPARDesign V11-T03 Current zPCR Version-9.4b - SpecCfg=YES

This macro evaluates the LPAR definition for HD eligible processors

To create a copy of this spreadsheet   Create a copy...   Optional but recommended

To start

PR/SM accepts configurations where the number of the HMC defined LPs is not consistent with the number of LPs needed to sustain the share of the LPAR

Accept SPECIAL ConF ?   YES

Change Customer Name / ID   } The Study ID

2 - Change Configuration	
Machine-Type	8561-718
#zIIP	18
#ICF	18
#IFL	18

} The configuration

==> Not HD Eligible

To save results   ======>   Save as...

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DISCLAIMER OF WARRANTIES:
The following [enclosed] macro is sample code created by *Alain Maneville - IBM France.*
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The TASK BAR – Will appear when opening the worksheet

The Goal : An easy way to go from worksheet to worksheet and perform actions
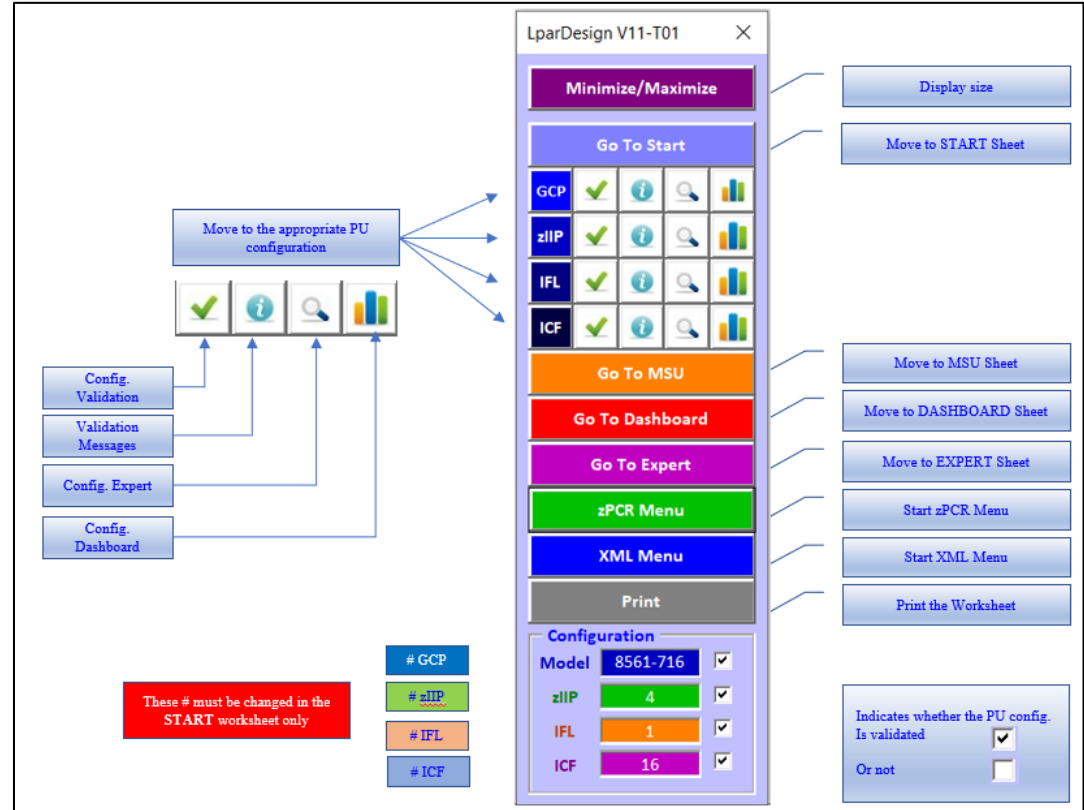
The Worksheets and their usage

START	CONFIG	CONFIG-zXXP	CONFIG-IFL	CONFIG-ICF	CONFIG-MSU	EXPERT	SYNTHESIS	DASHBOARD-HD

Specifying general parameters

Config HD for GCP. Link to zPCR

Config HD for zXXP. zIIP only

Config HD for IFL.

Config HD for ICF.(For zPCR link only

Config HD for MSU and GCL

Config optimization and guidelines

Result synthesis w and w/o HD

Visualization of LP spread

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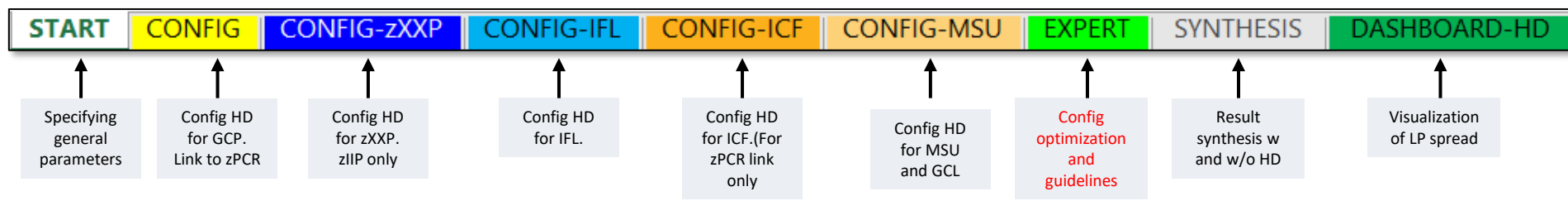
Use Case #1 – A real customer configuration

Spreadsheet-UC1 - General Usage explanation

Use Case #2 – A real customer configuration

Spreadsheet UC2 - How to use the EXPERT spreadsheet recommandations

Use Case #3 – A configuration – with special features….

Spreadsheet UC3 - The effect of: **Accept SPECIAL ConF ?**

Use Case #4 – Special calculation – 1/4

Spreadsheet UC4 - Can we have a VM with an entitlement of 100% ?

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Use Case #4 – Special calculation – 2/4 – LPAR W014

Spreadsheet UC4 - Can we have a VM with an entitlement of 100% ?

ID=IBM Corp. - LPARDesign V10-T01 Current zPCR Version-9.2a - SpecCfg=YES LPAR DEFINITION (CP)														

				ψMachine	Shared-Pool										
CFG-LP-VALID?	YES		#PhyProc	12	10										
Machine-type	3906-712		#LPs (non-ICF, non-DED)	16	Ded-Pool										
MSU	2 077		Ratio LP/PP (base)	1.60	2										
Total Weight	1 000		LSPR-AVG-V2R2-MI	17 294											
Max LPAR	85		#LPARs	8						HD supported on 3906					

LPARNAME	WEIGHT	#LP	%SHARE (By Pool)	RESERVED	Guaranteed #PP	Wkld LSPR	MinReq#LP	Check#LP	HD-HIGH#	HD-MED#	HD-MED%	HD-LOW#	#Active LPs	#Report LPs
W013	300	3	30.0%		3.000	High	3	OK	3	0	N/A	0	3	3
W014	200	3	20.0%		2.000	Average	2	OK	1	1	100.0%	1	2	2
W015	200	2	20.0%		2.000	Average	2	OK	2	0	N/A	0	2	2
W017	140	2	14.0%		1.400	High	2	OK	0	2	70.0%	0	2	2
W018	10	2	1.0%		0.100	High	1	OK	0	1	10.0%	1	2	1
W019	DED	2	100.0%		2.000	Average	2	OK	2	0	N/A	0	2	2
W020	100	2	10.0%		1.000	Average	1	OK	0	1	100.0%	1	2	1
W021	50	2	5.0%		0.500	High	1	OK	0	1	50.0%	1	2	1

W014	(R6-GCP) - You have a potentiel entitlement of 2-VH But as you have 1-VL, one VH is moved to the VM pool to fuel future Unparked VL, and you will have 1-VH and 1-VM@100%" [+] NOTE - You have 1VM and 1VL When ALL Vls will be UnParked, each VM and VL will have an entitlement of 50%

If you have a VL you MUST have a VM for the VL to join the VM Pool – Or You can NOT have VH and VLs .. You need VM

Configuration Validation

Delete selected LPAR

Spreadsheet UC4 - Can we have a VM with an entitlement of 100% ?

ID=IBM Corp. - LPARDesign V10-T01   Current zPCR Version-9.2a - SpecCfg=YES   LPAR DEFINITION (CP)

			ψMachine	Shared-Pool
CFG-LP-VALID?	YES	#PhyProc	12	10
Machine-type	3906-712	#LPs (non-ICF, non-DED)	16	Ded-Pool
MSU	2 077	Ratio LP/PP (base)	1.60	2
Total Weight	1 000	LSPR-AVG-V2R2-MI	17 294	
Max LPAR	85	#LPARs	8	

Configuration Validation

Delete selected LPAR

HD supported on 3906

LPARNAME	WEIGHT	#LP	%SHARE (By Pool)	RESERVED	Guaranteed #PP	Wkld LSPR	MinReq#LP	Check#LP	HD-HIGH#	HD-MED#	HD-MED%	HD-LOW#	#Active LPs	#Report LPs
W013	300	3	30.0%		3.000	High	3	OK	3	0	N/A	0	3	3
W014	200	3	20.0%		2.000	Average	2	OK	1	1	100.0%	1	2	2
W015	200	2	20.0%		2.000	Average	2	OK	2	0	N/A	0	2	2
W017	140	2	14.0%		1.400	High	2	OK	0	2	70.0%	0	2	2
W018	10	2	1.0%		0.100	High	1	OK	0	1	10.0%	1	2	1
W019	DED	2	100.0%		2.000	Average	2	OK	2	0	N/A	0	2	2
W020	100	2	10.0%		1.000	Average	1	OK	0	1	100.0%	1	2	1
W021	50	2	5.0%		0.500	High	1	OK	0	1	50.0%	1	2	1

W020	(R6-GCP) - You have a potentiel entitlement of 1-VH But as you have 1-VL, one VH is moved to the VM pool to fuel future Unparked VL, and you will have 0-VH and 1-VM@100%" [+] NOTE - You have 1VM and 1VL When ALL Vls will be UnParked, each VM and VL will have an entitlement of 50%

Remember that the 1st VL of a 2 LP configuration is ALWAYS **UnParked**

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Use Case #4 – Special calculation – 4/4 – LPAR W020

Spreadsheet UC4 - Can we have a VM with an entitlement of 100% ?
- **The effect of changing W014 #LP from 3 to 2**

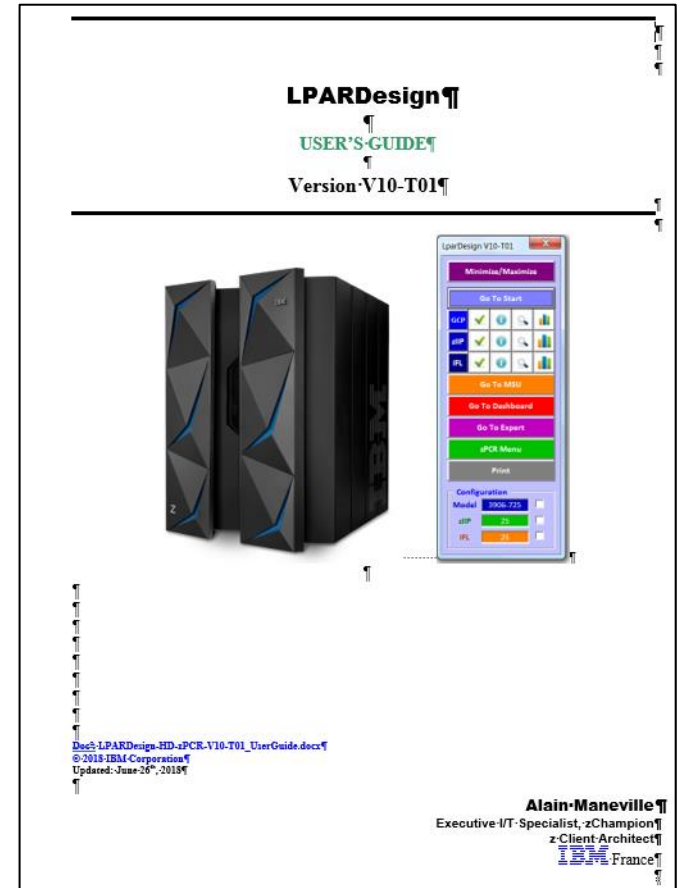| LPARNAME	WEIGHT	#LP	%SHARE (By Pool)	RESERVED	Guaranteed #PP	Wkld LSPR	MinReq#LP	Check#LP	HD-HIGH#	HD-MED#	HD-MED%	HD-LOW#	#Active LPs	#Report LPs
W013	300	3	30.0%		3.000	High	3	OK	3	0	N/A	0	3	3
W014	200	3	20.0%		2.000	Average	2	OK	1	1	100.0%	1	2	2
W015	200	2	20.0%		2.000	Average	2	OK	2	0	N/A	0	2	2
W017	140	2	14.0%		1.400	High	2	OK	0	2	70.0%	0	2	2
W018	10	2	1.0%		0.100	High	1	OK	0	1	10.0%	1	2	1
W019	DED	2	100.0%		2.000	Average	2	OK	2	0	N/A	0	2	2
W020	100	2	10.0%		1.000	Average	1	OK	0	1	100.0%	1	2	1
W021	50	2	5.0%		0.500	High	1	OK	0	1	50.0%	1	2	1

LPARNAME	WEIGHT	#LP	%SHARE (By Pool)	RESERVED	Guaranteed #PP	Wkld LSPR	MinReq#LP	Check#LP	HD-HIGH#	HD-MED#	HD-MED%	HD-LOW#	#Active LPs	#Report LPs
W013	300	3	30.0%		3.000	High	3	OK	3	0	N/A	0	3	3
W014	200	2	20.0%		2.000	Average	2	OK	2	0	N/A	0	2	2
W015	200	2	20.0%		2.000	Average	2	OK	2	0	N/A	0	2	2
W017	140	2	14.0%		1.400	High	2	OK	0	2	70.0%	0	2	2
W018	10	2	1.0%		0.100	High	1	OK	0	1	10.0%	1	2	1
W019	DED	2	100.0%		2.000	Average	2	OK	2	0	N/A	0	2	2
W020	100	2	10.0%		1.000	Average	1	OK	0	1	100.0%	1	2	1
W021	50	2	5.0%		0.500	High	1	OK	0	1	50.0%	1	2	1

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PLEASE …

READ THE USER's GUIDE

Thierry Deleris will now explain
- The zPCR Interface
- The LPARDesign Extended Tool

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Merci !

Alain Maneville