



Adrián Álvarez Diez – IBM Germany R & D

z/OS Capacity Provisioning



management concepts & basic mechanisms
+ z/OS V2R3 updates

Agenda

Capacity Provisioning's field of activity
infrastructure & processing modes
configuration & operation
management examples
reports, logs & audit trails
V2R3 enhancements
links & documentation

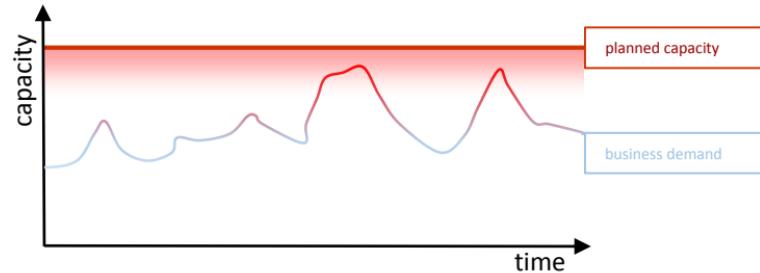


See <http://www.ibm.com/legal/copytrade.shtml> for a list of trademarks

Changing the approach to Capacity Planning

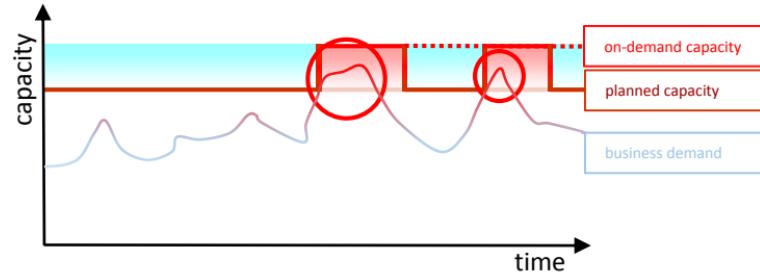
static - setting maximum limit

- planning guided by **potential** consumption peaks
- probability of billing periods with unused surplus capacity



elastic - setting base capacity limit

- planned capacity based on **expected** consumption
- dynamically covered unexpected consumption peaks



Typical delays with manual capacity upgrades

1. workload increases	0 min
2. operator realizes bottleneck	+10 min
3. operator informs system programmers and manager	+5 min
4. discussion	+10 min
5. logon to HMC, change capacity	+5 min
total delay	30 min

... meanwhile, so much workload may have queued up, that a small amount of additional capacity is insufficient to decrease the queued workload



much more capacity has to be added

Typical CPM activation reaction time

1. policy ProvisioningCondition fulfilled – full duration **60 sec**
(e.g. PI above 1.3 for at least **1 minute**)
 2. RMF MinTime reporting delay – \emptyset 50% **+15 sec**
(e.g. MinTime **30 seconds**)
 3. CPM Analyzer.CycleTime evaluation delay – \emptyset 50% **+15 sec**
(adjustable to e.g. **30 seconds**)
 4. OOCoD activation lag – \emptyset 50% **+30 sec**
(60 seconds on z13 by BCPii/HW)
- total detection & activation delay** **60 sec**
- 

CPM can react faster and reduce cost

Capacity Provisioning basics

- CP is a **z/OS base** component – **free of charge**
- CPM is mostly **zAAP*** **eligible** Java workload (*zIIP on z13/z14)
- requires **monitoring component** (z/OS RMF or equivalent) on observed z/OS system, but **only for on-demand** management
- exploits System z **On/Off Capacity on Demand** feature
 - OOCoD record must be active
 - activates CPC-wide shared processors
- exploits **Defined Capacity** and Group Capacity
- single CPM instance can **control** capacity on **any number of CPCs or z/OS systems**
 - management not limited to CPM's local CPC or local sysplex



Agenda

Capacity Provisioning's field of activity
infrastructure & processing modes
configuration & operation
management examples
reports, logs & audit trails
V2R3 enhancements
links & documentation

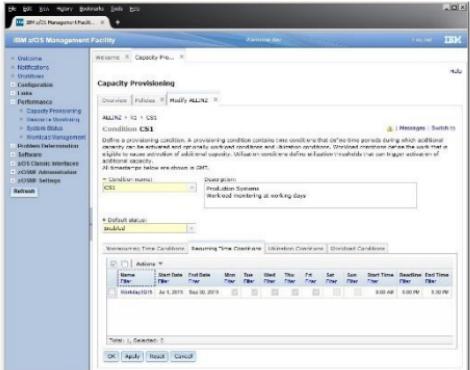


Main Components of Capacity Provisioning

Capacity Provisioning Manager (CPM)

- server program that manages CPCs and monitors systems
- customized with the CP Domain Configuration and Policy
- takes management actions as appropriate
- command interaction and messaging via console

```
CPO1042I Activity report generated at 11/17/2015 07:51:47
Number of activities between 11/15/2015 and 11/17/2015 was 6
Activation for CPC CPC2 at 11/16/2015 15:02:01
Activation of model 729, 2 zAAPs and 2 zIIPs
Inducing policy element is policy PROD4015, rule RPHQ3,
provisioning condition NORM2, time condition HISHIFT2
Inducing utilization condition HICP1
-
Activation for LPAR LPAR1 on CPC CPC1 at 11/15/2015 07:33:10
Activation of 25 MSU
Capacity after activation: 175 MSU
Capacity before activation: 150 MSU
Inducing policy element is policy PROD4015, rule MIDMONTH,
provisioning condition WEEKEND, time condition SatSunday
Inducing system is PROD1 in sysplex PRODPLEX
Inducing workload is WLM service definition PRODDEF,
policy PRODPOL, service class period CICSHIGH.1
-
```

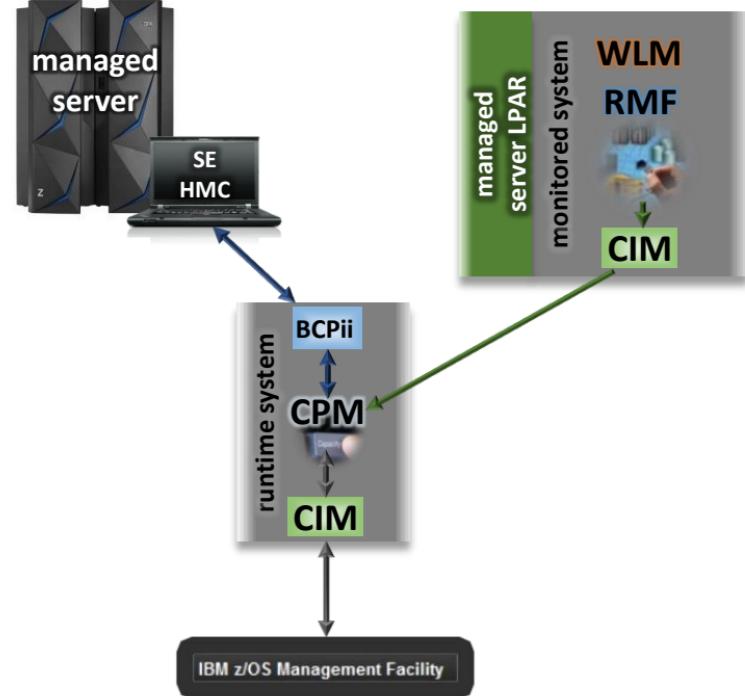


z/OSMF Capacity Provisioning task

- browser UI for administering CP configuration entities Domain Configuration and Policy
- interacts with CPM
- not required for regular operation of CPM

CPM infrastructure

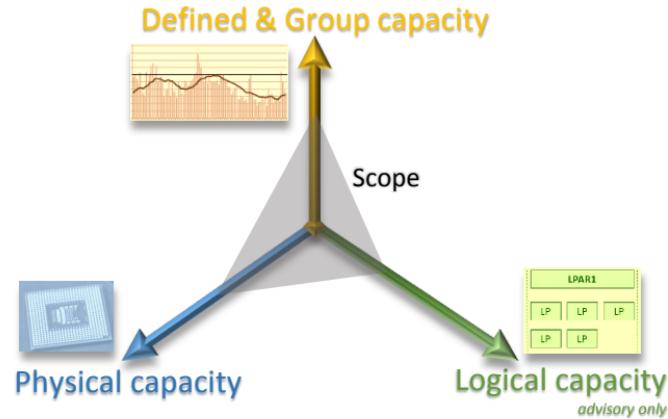
- z/OS WLM manages workloads to goals and business importance
- WLM indicators available through performance monitor
 - e.g. z/OS RMF
 - 1 RMF gatherer per system
 - 1 RMF DDS per sysplex
- z/OS base element CIM for communication with performance monitor and z/OSMF
- BCPii for communication with hardware (SE/HMC)



CP management in a nutshell

policy-based navigation in a n-dimensional resource space

- supported processor dimensions
 - physical capacity**
CEC wide OOCoD
 - logical capacity**
system oriented
 - Defined & Group Capacity**
soft-capping limits
- CPM policy specifies navigation limits/scope
for each dimension



provisioning triggers

- | | |
|------------------------|--------------------|
| • manual | <i>interactive</i> |
| • time schedules | <i>planned</i> |
| • workload performance | <i>on-demand</i> |
| • resource utilization | <i>on-demand</i> |



Processing modes – a gradual approach to CPM

operate CPM in different degrees of automation

processing mode

manual

- change capacities immediately via CPM commands
- interactive mode not needing active CP policy

analysis

- CPM processes policy and advises operator when capacity change becomes due according to policy criteria
- operator decides whether to change capacity manually

confirmation

- CPM processes policy, OOCoD record and Defined Capacity levels are examined
- every capacity change action needs to be authorized (confirmed) by the operator

autonomic

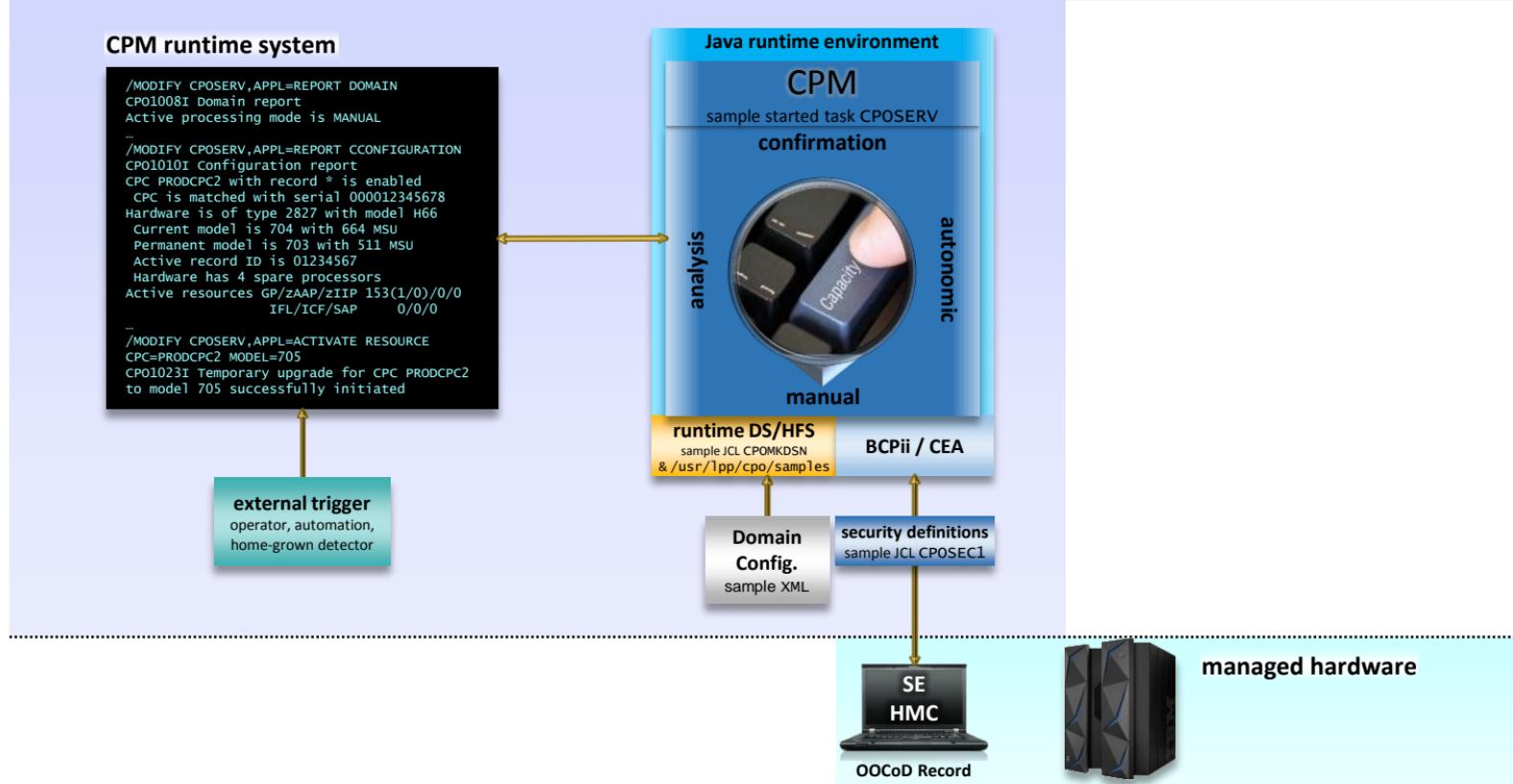
- similar to confirmation mode, no operator intervention required

minimum requirements

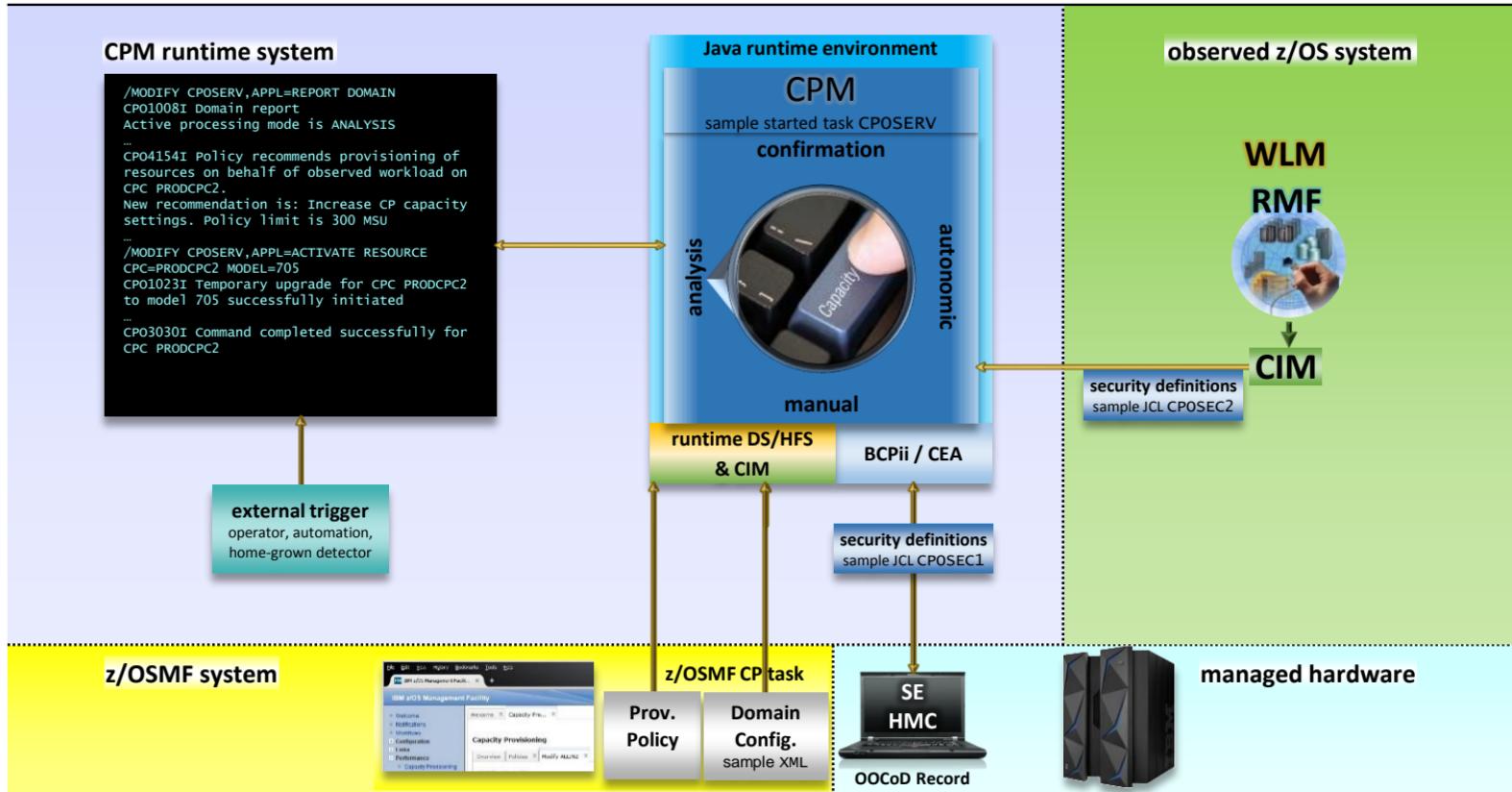
- HMC connectivity via BCPII
- OOCoD record or Defined Capacity set
- Domain Configuration with managed CPCs
- Policy
- Domain Configuration with observed systems
- CIM & monitoring product on each observed system



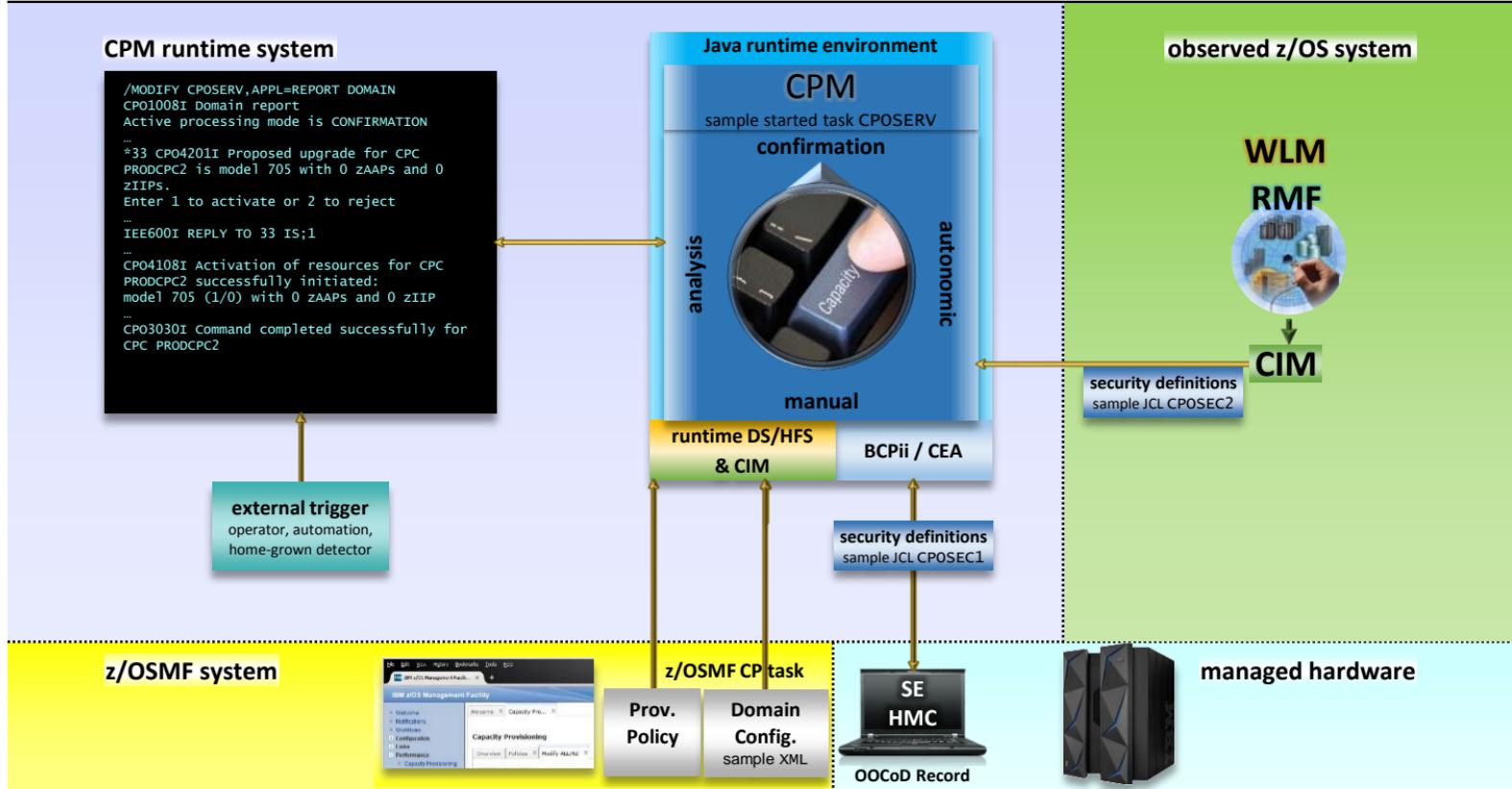
Processing Modes – req'd infrastructure – MANUAL



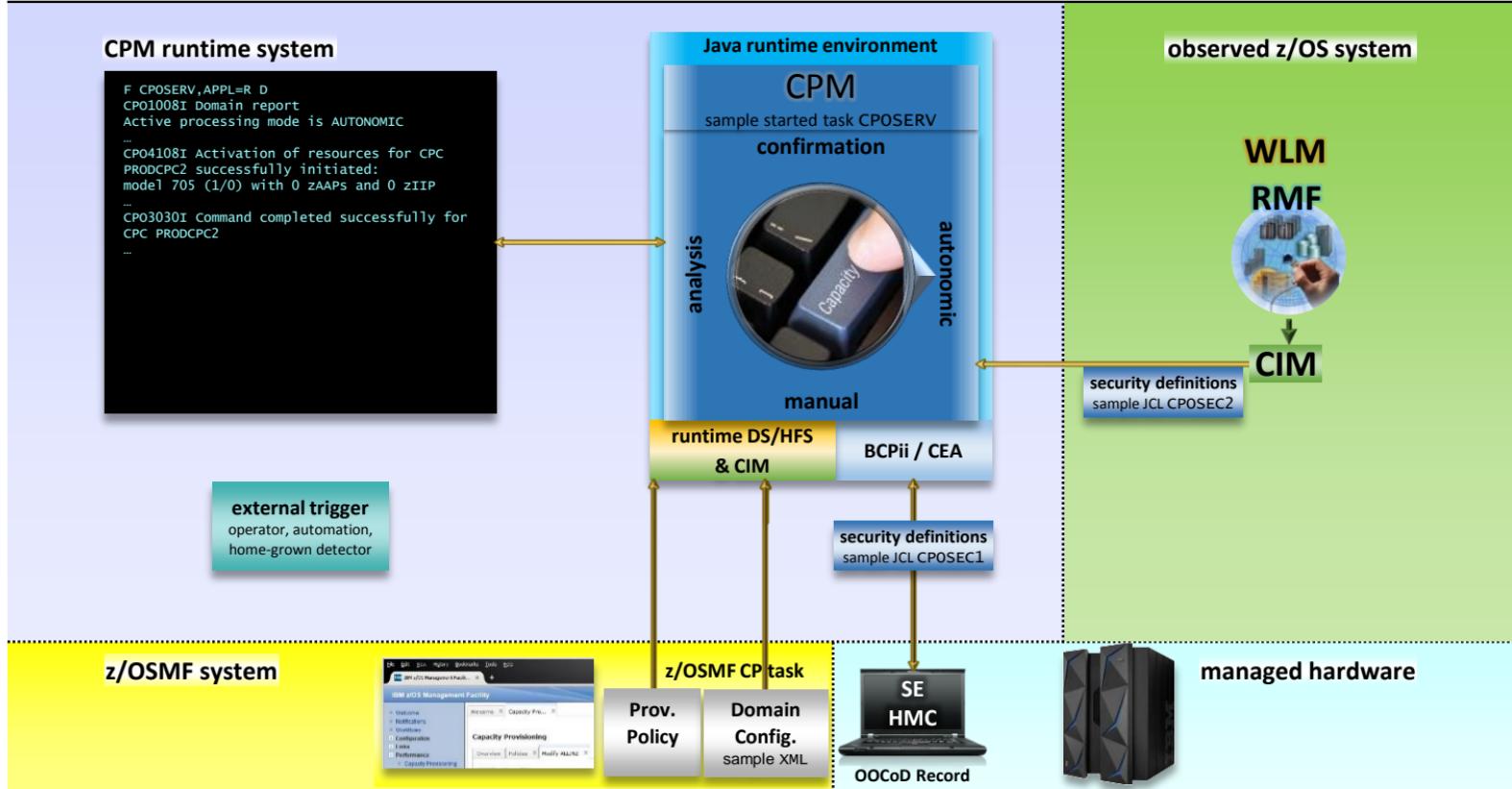
Processing Modes – req'd infrastructure – ANALYSIS



Processing Modes – req'd infrastructure – CONFIRMATION



Processing Modes – req'd infrastructure – AUTONOMIC



Agenda

Capacity Provisioning's field of activity
infrastructure & processing modes
configuration & operation
management examples
reports, logs & audit trails
V2R3 enhancements
links & documentation



Configuration – CPM definition entities

Domain Configuration

topology and connections

- managed CPCs
- monitored z/OS systems

Policy

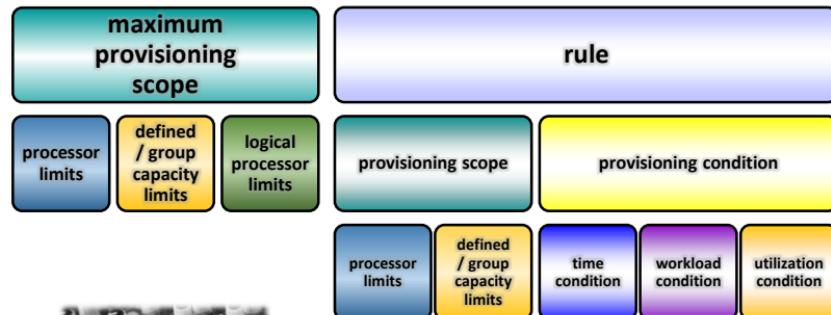
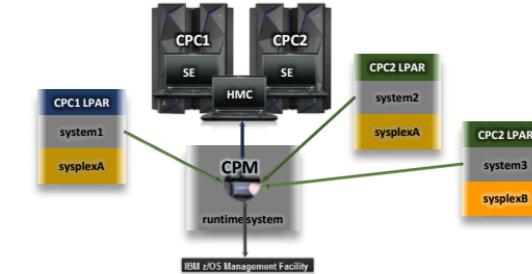
rules and conditions

- allowed activation scope
- permitted timeframes
- provisioning-eligible workload condition or consumption level

Processing parameters

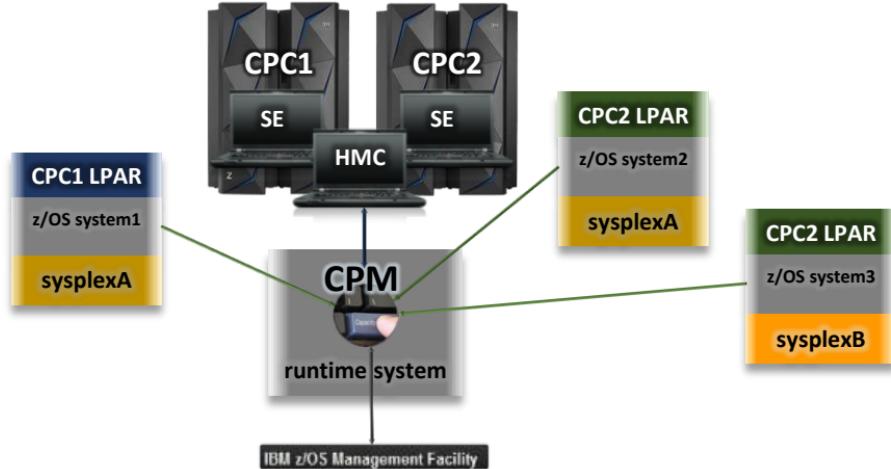
setup instructions

- environment variables
- processing options



Domain Configuration

- defines **CPCs** and **z/OS systems** controlled by a CPM instance (= a CP domain)
- one or more CPCs, sysplexes and z/OS systems can be defined into a CP domain
- CPCs and sysplexes do not need to be completely contained in a CP domain, but should not belong to more than one managed CP domain at the same time
- one active CP policy per CP domain
- multiple sysplexes and hence multiple WLM service definitions may be involved at once



Scenario 1 – manual activation via command line

Domain Configuration

PROD1CFG
Managed CPC: Z14A

Configuration Report

```
/MODIFY CPOSERV,APPL=REPORT CONFIGURATION
CPO1010I Configuration report generated at 12/18/2015 18:15:00
Domain configuration PROD1CFG for domain PROD1DOM is enabled
CPC Z14A with record none is enabled (default enabled)
CPC is matched with serial 0123456789AB since 01/01/2015 12:00:09
Hardware is of type 3906 with model M03
Current model is 703 with 620 MSU, 0 ZAAPs, 2 zIIPs
```

activate Group Capacity

```
/MODIFY CPOSERV,APPL=ACTIVATE GC CPC=Z14A GROUP=GRP1 MSU=255
CPO1298I Group capacity for group GRP1 on CPC Z14A increased to
255 MSU
```

-
- manual activations **don't require** a defined **Policy**
 - very simple Domain Configuration xml **doesn't** necessarily **need** the implementation of **z/OSMF** – could be edited manually
 - interactive command-line can be combined with your **automation** product or scripts for scheduled / semi-automatic activations
 - activation via CPM **avoids** time-consuming navigation in **HMC/SE**

Scenario 1 – simple Domain Configuration xml

Domain Configuration

PROD1CFG

Managed CPC: Z14A

Domain Configuration xml

```
<?xml version="1.0" ?>
<DomainSpecification
  xmlns="http://www.ibm.com/xmlns/prod/cpm/2013/09/DomainSpecification.xsd">
  <Name>PROD1CFG</Name>
  <Description>Simple Domain Configuration</Description>
  <Level>002</Level>
  <ManagedCPCs>
    <ManagedCPC>
      <Name>Z14A</Name>
      <Enabled>Yes</Enabled>
      <LICRecordId>*</LICRecordId>
    </ManagedCPC>
  </ManagedCPCs>
</DomainSpecification>
```

-
- use sample /usr/lpp/cpo/samples/CPSAMDOM.xml as pattern for your Domain Configuration xml
 - copy your xml as member PROD1CFG into the CPM PDS (CPO.DOMAIN1.DOMCFG) and activate it with
SET DOMAIN CFG=PROD1CFG

Scenario 1 – manual activation with system monitoring

Domain Configuration

PROD1CFG
managed CPC: Z14A
monitored system: PROD1

Configuration Report

```
/MODIFY CPOSERV,APPL=REPORT CONFIGURATION
CPO1010I Configuration report generated at 12/18/2015 18:15:00
Domain configuration PROD1CFG for domain PROD1DOM is enabled
CPC Z14A with record none is enabled (default enabled)
CPC is matched with serial 0123456789AB since 01/01/2015 12:00:09
Hardware is of type 3906 with model M03
Current model is 703 with 620 MSU, 0 ZAAPs, 2 zIIPs,
...
System PROD1 in sysplex PRODPLX is enabled (default enabled)
Primary host address: 123.456.789.012
...
LPAR PRODLP1 in capacity group GRP1 with 200 MSU
```

activate Group Capacity

```
/MODIFY CPOSERV,APPL=ACTIVATE GC CPC=Z14A GROUP=GRP1 MSU=255
CPO1298I Group capacity for group GRP1 on CPC Z14A increased to
255 MSU

CPO3985I Group capacity change detected. New capacity is 255 MSU
for capacity group GRP1 of CPC Z14A
```

-
- system monitoring system within manipulated Capacity Group allows **tracking of current Group Capacity level**
 - system monitoring requires at least processing mode analysis

Scenario 1 – simple Domain Configuration xml

Domain Configuration

PROD1CFG
managed CPC: Z14A
monitored system: PROD1

Domain Configuration xml

```
<?xml version="1.0" ?>
<DomainSpecification
  xmlns="http://www.ibm.com/xmlns/prod/cpm/2013/09/DomainSpecification.xsd">
  <Name>PROD1CFG</Name>
  <Description>Simple Domain Configuration</Description>
  <Level>002</Level>
  <ManagedCPCs>
    <ManagedCPC>
      <Name>Z14A</Name>
      <Enabled>Yes</Enabled>
      <LICRecordId>*</LICRecordId>
    </ManagedCPC>
  <ObservedSystems>
    <ObservedSystem>
      <Name>PROD1</Name>
      <Sysplex>PRODPLX</Sysplex>
      <Enabled>Yes</Enabled>
      <PrimaryHostAddress>123.456.789.012</PrimaryHostAddress>
      <Protocol>HTTP</Protocol>
      <Port>5988</Port>
    </ObservedSystem>
  </ObservedSystems>
</DomainSpecification>
```

Policy – basic approach

CP policy defines circumstances under which additional capacity may be provisioned

- 3 dimensions of criteria considered:

- **when** is provisioning allowed
- **which workload or processor load** qualifies for provisioning
- **how much additional capacity** may be activated at most

- criteria are specified as **rules** in the policy:

```
if {  
    the specified work or processor suffer  
    in the specified time interval  
}  
then {  
    activate up to the specified additional capacity  
}
```

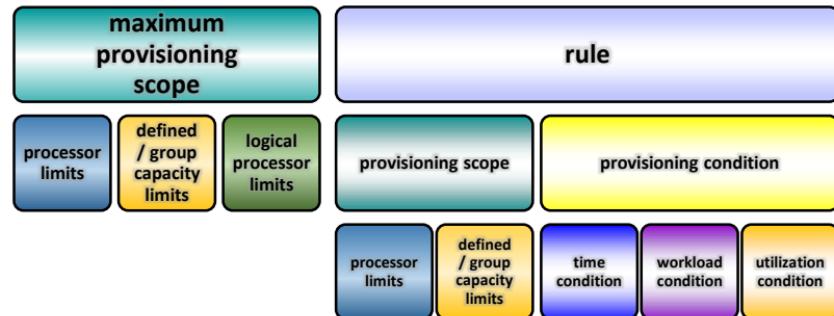
- specified rules and conditions are named and may be enabled or disabled selectively by operator commands

Policy – overview

- **Maximum Provisioning Scope**

additional capacity allowed
to be activated by all contained rules:

- specified as number of specialty processors
- as MSU for general purpose capacity
- as 4hra MSU for Defined and Group Capacity



- **Rule**

combination of **Provisioning Scopes** and **Conditions**, can be (de)activated at runtime

- **Provisioning Scope**

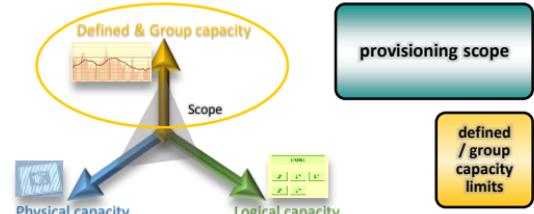
additional capacity allowed to be activated based on the Rule

- **Provisioning Condition**

combination of **Time Conditions** and optional **Workload Conditions** or **Utilization Conditions**

Policy – Provisioning Scope – Defined Capacity Limits

- specified through the system + sysplex name within domain
 - CPM automatically maps scope to correct LPAR
- max amount of **additional** 4hra MSU that may be activated
 - required **delta** capacity is activated by CPM
- two flavours of Provisioning Scope:
 - **maximum provisioning scope**: potential upper limit of total activations in MSU for all contained rules at any point in time
 - contains **capacity increments** for gradual on-demand activations, defined in MSU
 - **provisioning scope** on rule-level: potential upper limit of activation for that rule at any point in time
 - Allows for definitions like:
authorized additional Defined Capacity up to 300 MSU for workload 1 and up to 200 MSU for workload 2, but at no point in time more than additional 400 MSU

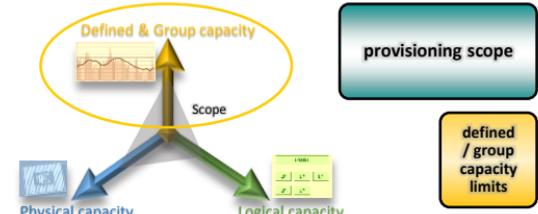


system	sysplex	max. MSU	primary increment MSU	secondary increments MSU
PRODSYS1	PLX1	400	45	35

rule	max. MSU
WORKLOAD1	300
WORKLOAD2	200

Policy – Provisioning Scope – Group Capacity Limits

- specified through group name and CPC within domain
 - CPM verifies existence of group and CPC
- max amount of **additional** 4hra MSU that may be activated
 - required **delta** capacity is activated by CPM
- two flavours of Provisioning Scope:



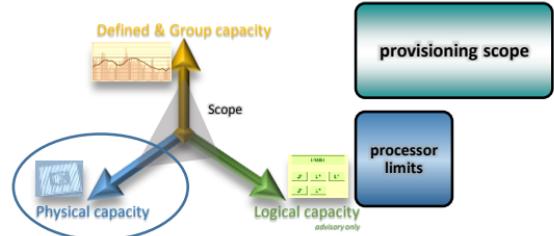
- **maximum provisioning scope**: potential upper limit of total activations in MSU for all contained rules at any point in time
 - contains **capacity increments** for gradual on-demand activations, defined in MSU
- **provisioning scope** on rule-level: potential upper limit of activation for that rule at any point in time
- Allows for definitions like:
authorized additional Group Capacity up to 300 MSU for workload 1 and up to 200 MSU for workload 2, but at no point in time more than additional 400 MSU

group	CPC	max. MSU	primary increment MSU	secondary increments MSU
PRODGRP1	CPC1	400	45	35

rule	max. MSU
WORKLOAD1	300
WORKLOAD2	200

Policy – Provisioning Scope – Processor Limits

- specified for CPC within domain
- max amount of **additional** MSU (CP) or number of specialty processors that may be activated
 - required **delta** capacity is activated by CPM
- two flavours of Provisioning Scope:
 - **maximum provisioning scope**: potential upper limit of total activations in MSU or number of processors for all contained rules at any point in time
 - contains **capacity increments** for gradual on-demand activations, defined in MSU for CP (not models)
 - **provisioning scope** on rule-level: potential upper limit of activation for that rule at any point in time
 - Allows for definitions like:
authorized additional General Purpose capacity up to 300 MSU for workload 1 and up to 200 MSU for workload 2, but at no point in time more than additional 400 MSU



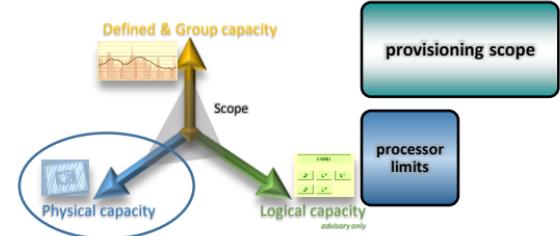
CPC	max. MSU	primary increment MSU	secondary increments MSU	max. zAAPs	max. zIIPs
CPC1	400	100	150	0	3

rule	max. MSU
WORKLOAD1	300
WORKLOAD2	200

Policy – Mapping Processor Limits to ITR ratios

- CPM maps policy MSU definitions to ‘real’ ITR ratios
 - at most,
CPM activates the processor model
that doesn’t exceed the amount of allowed extra MSU
as specified in **max. MSU**
 - for each on-demand increment,
CPM activates the next processor model
with **at least** the specified amount of additional
primary increment MSU or secondary increments MSU

CPC	max. MSU	primary increment MSU	secondary increments MSU
Z14A	400	100	150



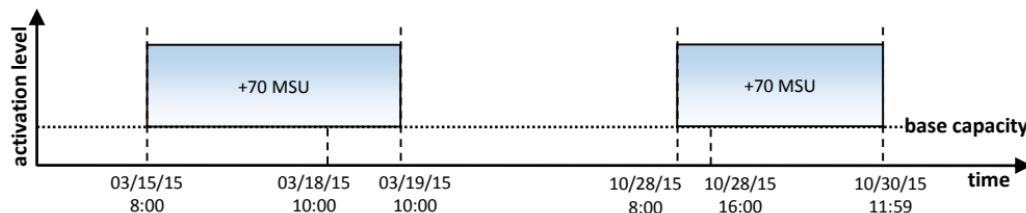
z13 (2904) ITR			
model	MSU	rel. ΔMSU	tot. ΔMSU
715	2244	0	0
716	2358	114	114
717	2472	114	228
718	2584	112	340
719	2695	111	451
720	2801	106	557

Policy – Provisioning Condition – Time Condition

- defines when capacity **should** be activated
 - **start time**: full provisioning requested
 - **deadline**: provisioning no longer allowed
 - **end time**: full deactivation requested
- **scheduled activation**, if specified without additional workload or utilization condition
 - full capacity as specified in the rule scope
 - unconditional activation at start time and de-activation at end time



name	start time	deadline	end time
TC1	03/15/15 08:00	03/18/15 10:00	03/19/15 10:00
TC2	10/28/15 08:00	10/28/15 16:00	10/30/15 11:59



Scenario 2 – scheduled activation at predefined time

Domain Configuration

PROD2CFG
managed CPC: Z14A
monitored system: PROD1

Policy

PROD2POL
scope for capacity group GRP1 – Z14A: 75 MSU
time condition: 12/21/2015 start: 9:00 – deadline: 14:00 – end: 17:00

Policy Report

```
/MODIFY CPOSERV,APPL=REPORT POLICY
CPO1005I Policy report generated at 12/18/2015 18:35:00
Policy PROD2POL is enabled
...
Group capacity scope:
  Group GRP1 in CPC Z14A limit is 75 MSU
...
Time condition DAYSHIFT is active and enabled
  s/d/e: 12/21/2015 09:00 / 12/21/2015 14:00 / 12/21/2015 17:00
```

planned activation of Group Capacity

```
09.00.00 ---- MONDAY, 21 DEC 2015 ----
CPO3963I Group capacity increase initiated to 275 MSU for group
GRP1 of CPC Z14A
```

- depending on its processing mode, CPM either advises to (analysis), asks for permission to (confirmation), or directly activates (autonomic) the additional amount of Group Capacity at the time defined in the policy

Scenario 2 – Policy in z/OSMF – 1. Policy

The screenshot shows the IBM z/OS Management Facility interface. The title bar displays "PROD2POL" and "scope for capacity group GRP1 – Z14A: 75 MSU time condition: 12/21/2015 start: 9:00 – deadline: 14:00 – end: 17:00". The left sidebar menu includes "Welcome", "Notifications", "Workflows", "Consoles", "Links", "Performance" (with "Capacity Provisioning" selected), "z/OSMF Administration", and "z/OSMF Settings". A "Refresh" button is also present. The main content area has tabs "Welcome" and "Capacity Provis...". The "Capacity Provisioning" section contains an "Overview" tab, which displays information about z/OS Capacity Provisioning and provides links to "View Status and Define Connections" (Provisioning Manager) and "Manage" (Domain Configurations, Policies, Settings). The "Settings" link is highlighted.

- z/OSMF Capacity Provisioning task for:
 - monitoring running CPMs
 - create, administer, and upload Domain Configurations and Policies to CPM

Scenario 2 – Policy in z/OSMF – 2. Policy

PROD2POL
scope for capacity group GRP1 – Z14A: 75 MSU
time condition: 12/21/2015 start: 9:00 – deadline: 14:00 – end: 17:00

Capacity Provisioning

Overview Policies x

Policies

Provisioning policies control the activation of additional capacity.
The table shows the list of policies stored in the z/OSMF repository (all timestamps below are shown in GMT):

Actions	Name Filter	Description Filter	Activity Filter	Message Filter	Last Modified Filter	Modified By Filter
<input checked="" type="checkbox"/> PROD2POL	Basic policy for scheduled				Apr 19, 2018, 10:06:35 AM	diez
<input type="checkbox"/> PROD3POL	for conditional				Apr 19, 2018, 10:10:09 AM	diez

Actions ▾
No filter applied

View
Modify
Delete...
Copy...
Install...
Export To File...

-
- z/OSMF Capacity Provisioning Policy editing:
 - XMLs are stored on the local z/OSMF system
 - need to be uploaded and activated on the CPM runtime system

Scenario 2 – Policy in z/OSMF – 3. Scope

PROD2POL
scope for capacity group GRP1 – Z14A: 75 MSU
time condition: 12/21/2015 start: 9:00 – deadline: 14:00 – end: 17:00

The screenshot shows the 'Capacity Provisioning' interface with the 'View PROD2POL' tab selected. The policy name is 'PROD2POL' and its description is 'Basic policy for scheduled activations'. The 'Maximum Group Capacity Scope' tab is active, showing a table with one row for 'GRP1' with values: CPC Filter (Z14A), Max. Increase (MSU) Filter (75), Primary Increment (MSU) Filter (25), and Secondary Increments (MSU) Filter (25). There is also a 'Rules' tab.

- at least one provisioning Scope (physical processor, Defined Capacity, Group Capacity) is required

Scenario 2 – Policy in z/OSMF – 4. Scope values

The screenshot shows the 'Capacity Provisioning' interface in z/OSMF. The top navigation bar has tabs for 'Overview', 'Policies' (which is selected), and 'Modify PROD2POL'. A sub-header 'PROD2POL' is displayed above the main content area. Below it, a message box shows the scope details: 'scope for capacity group GRP1 – Z14A: 75 MSU' and 'time condition: 12/21/2015 start: 9:00 – deadline: 14:00 – end: 17:00'. The main content area is titled 'Maximum Group Capacity Limit Z14A.GRP1'. It contains a descriptive text about defining capacity limits for a capacity group. Below this are several input fields with validation symbols (*):

- * Group: GRP1
- * CPC: Z14A
- * Max. increase (MSU): 75
- * Primary increment (MSU): 25
- * Secondary increments (MSU): 25

At the bottom, there is a note: 'Defined Maximum Group Capacity Limits'.

-
- a scope for a named resource is composed of a maximum value and intermediate (gradual) steps

Scenario 2 – Policy in z/OSMF – 5. Time Condition

Capacity Provisioning

Overview Policies **Modify PROD2POL**

PROD2POL > R1 > C1

Condition C1

Define a provisioning condition. A provisioning condition contains time conditions that define time periods during which additional capacity can be activated and optionally workload conditions and utilization conditions. Workload conditions define the work that is eligible to cause activation of additional capacity. Utilization conditions define utilization thresholds that can trigger activation of additional capacity (all timestamps below are shown in GMT):

* Condition name: C1

Description:

* Default status: Enabled

Nonrecurring Time Conditions Recurring Time Conditions Utilization Conditions Workload Conditions

Actions ▾

No filter applied

Name Filter	Start Time Filter	Deadline Time Filter	End Time Filter
T1	Dec 21, 2015 9:00 AM	Dec 21, 2015 2:00 PM	Dec 21, 2015 5:00 PM

PROD2POL
scope for capacity group GRP1 – Z14A: 75 MSU
time condition: 12/21/2015 start: 9:00 – deadline: 14:00 – end: 17:00

Messages | Switch to

PROD2POL
scope for capacity group GRP1 – Z14A: 75 MSU
time condition: 12/21/2015 start: 9:00 – deadline: 14:00 – end: 17:00

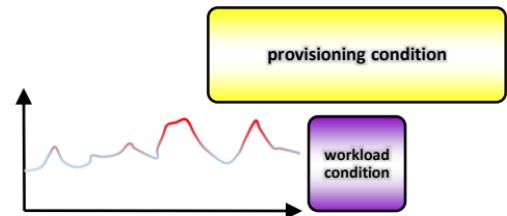
- at least one Time Condition is required

Policy – Provisioning Condition – Workload Condition

- identifies work that may **trigger** activation of additional capacity
 - triggers whenever work does not achieve its WLM goal due to insufficient capacity
and additional capacity of allowed type would help
 - can manage on behalf of **CICS**-server or CICS-transaction Service Classes
& sorts out (non CPU-critical) MAXTASK situations
-

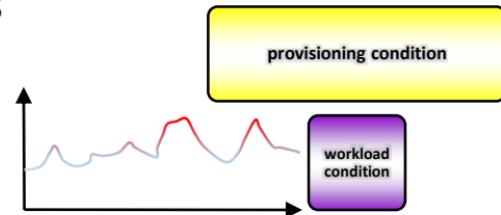
parameters

- validity area
 - PI scope of system & sysplex that may run eligible work
- workload specification
 - importance filter / Service Class list
- WLM Performance Index (PI) criteria
 - provisioning condition: PI limit and duration
 - de-provisioning condition: PI limit and duration



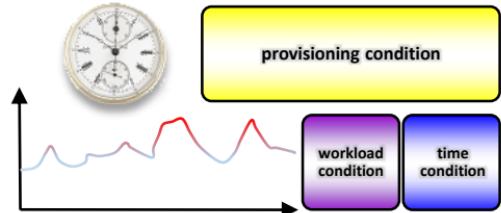
Policy – Provisioning Condition – Workload Condition PI

- properly adjusted WLM Service Class goals are compelling
 - for WLM to make best use of available processor resources
 - for CPM to help out with additional capacity as soon as WLM cannot fulfil its goals
- PI should be a timely indication of processor bottlenecks
- PI should decrease if situation normalizes

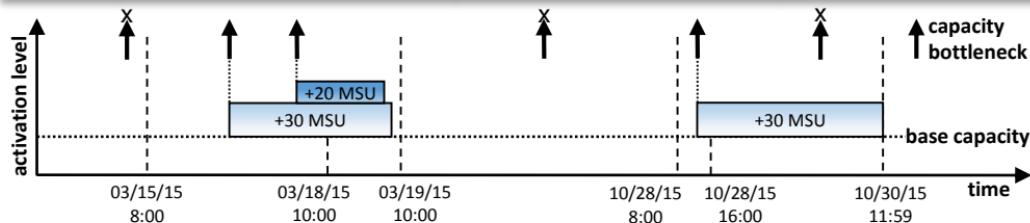


Policy – Provisioning Condition – on-demand timing

- time condition defines when capacity **may** be activated
 - start time**: provisioning allowed
 - deadline**: provisioning no longer allowed
 - end time**: full deactivation requested
- with additional workload or utilization condition, **conditional** activation is performed
 - between start time and deadline gradual activation as needed, at most up to the rule scope
 - before end time gradual de-activation of unneeded capacity, all at once after end time

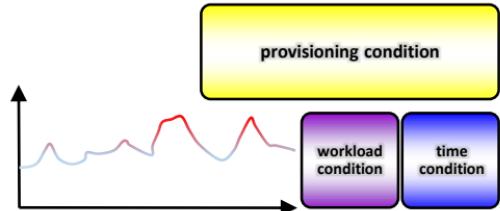


name	start time	deadline	end time
TC1	03/15/15 08:00	03/18/15 10:00	03/19/15 10:00
TC2	10/28/15 08:00	10/28/15 16:00	10/30/15 11:59



Policy – Provisioning Condition – on-demand monitoring

- workload is monitored between start and end time
- (de-)provisioning only after (de-)provisioning condition fulfilled
- mandatory grace-period between consecutive actions



Policy

PRODXPOL

scope for capacity group: 50 MSU

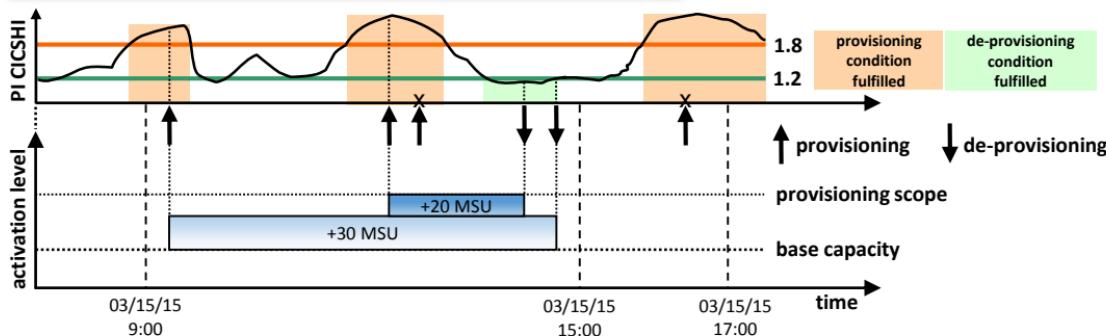
primary increment: 30 MSU; secondary increments: 20 MSU

time condition: 03/15/2015 start: 9:00 – deadline: 15:00 – end: 17:00

included service class: CICSHI

provisioning condition: PI \geq 1.8 for 35 min

de-provisioning condition: PI \leq 1.2 for 35 min



Scenario 3 – on-demand activation 1

Domain Configuration

PROD3CFG
managed CPC: Z14A
monitored system: PROD1 PRODPLX

Policy

PROD3POL
scope for capacity group GRP1 – Z14A: 75 MSU; increments: 25/10 MSU
time condition: 12/21/2015 start: 9:00 – deadline: 14:00 – end: 17:00
workload condition: provisioning if Service Class CICSHI on system PROD1 sysplex PRODPLX
with PI > 1.8 for at least 5 minutes

Policy Report

```
/MODIFY CPOSERV,APPL=REPORT POLICY
CPO1005I Policy report generated at 12/18/2015 18:35:00
Policy PROD3POL is enabled
...
Group capacity scope:
  Group GRP1 in CPC Z14A limit is 75 MSU, activation of 25/10 MSU
...
Time condition DAYSHIFT is active and enabled
  s/d/e: 12/21/2015 09:00 / 12/21/2015 14:00 / 12/21/2015 17:00
...
Workload condition TRANSACT for sysplex PRODPLX System name "PROD1"
  Included: /*/*CICSHI.1
  PL/PD/DL/DD/S 1.8 5 1.3 15 System
```

-
- CPM starts monitoring the specified workload at start time for performance bottlenecks

Scenario 3 – on-demand activation 2

on-demand activation of Group Capacity

```
10.32.00 ---- MONDAY, 21 DEC 2015 ----  
CPO3963I Group capacity increase initiated to 225 MSU for group  
GRPL of CPC Z14A
```

Workload Report

```
/MODIFY CPOSERV,APPL=REPORT WORKLOAD  
CPO1047I workload report generated at 12/21/2015 10:35:00  
...  
workload for system PROD1 of sysplex PRODPLX on CPC Z14A  
CICS.1 PL/PD/DL/DD/S 1.8 5 1.3 15 System  
PI from 12/21/2015 10:34 is 2.14  
Last limit crossing was 12/21/2015 10:28  
...  
Demand for additional group capacity recognized
```

subsequent activation of Group Capacity

```
10.47.00 ---- MONDAY, 21 DEC 2015 ----  
CPO3963I Group capacity increase initiated to 235 MSU for group  
GRPL of CPC Z14A
```

- gradual Group Capacity activation starts as soon as Provisioning Condition is fulfilled and capping is imminent
- activation continues as long the problem persists, up to the defined scope

Scenario 3 – Policy in z/OSMF – 6. Scope increments

PROD3POL
scope for capacity group GRP1 – Z14A: 75 MSU; **increments: 25/10 MSU**
time condition: 12/21/2015 start: 9:00 – deadline: 14:00 – end: 17:00
workload condition: provisioning if Service Class CICSH1 on system PROD1 sysplex PRODPLX with PI > 1.8 for at least 5 minutes

Capacity Provisioning

Overview Policies **View PROD3POL**

Policy PROD3POL Messages | Switch to

A provisioning policy contains provisioning scopes and a set of rules. The scopes define provisioning limits for different types of capacity. They restrict the capacity that can be activated by the rules in the policy. The rules contain provisioning scopes and a set of conditions for the activation of additional capacity.

Policy name: **PROD3POL** Description: Basic policy for conditional activations

Maximum Processor Scope Logical Processor Scope Maximum Defined Capacity Scope **Maximum Group Capacity Scope** Rules

Actions ▾

No filter applied

Group Filter	CPC Filter	Max. Increase (MSU) Filter	Primary Increment (MSU) Filter	Secondary Increments (MSU) Filter	
<input type="checkbox"/> GRP1	Z14A	75	25	10	

- Scope Increments define gradual steps for conditional activations

Scenario 3 – Policy in z/OSMF – 7. Workload condition

PROD3POL
scope for capacity group GRP1 – Z14A: 75 MSU; increments: 25/10 MSU
time condition: 12/21/2015 start: 9:00 – deadline: 14:00 – end: 17:00
workload condition: provisioning if Service Class **CICSHI** on system **PROD1** sysplex **PRODPLX** with **PI > 1.8 for at least 5 minutes**

Capacity Provisioning

Overview Policies **View PROD3POL**

PROD3POL > R1 > C1 > WLC1

Workload Condition WLC1

A workload condition specifies the work that is eligible to cause activation of additional capacity and the conditions under which that work can trigger this activation.

Name: **WLC1** Description: **Triggers for conditional activations**

System: Sysplex: **PROD1** PRODPLX

Importance Filters **Included Service Classes** Excluded Service Classes

Actions ▾ **No filter applied**

Service Definition Filter	Service Policy Filter	Service Class Filter	Period Filter	Provisioning PI Filter	Provisioning Duration (Minutes) Filter	Deprovisioning PI Filter	Deprovisioning Duration (Minutes) Filter	PI Scope Filter
<input type="checkbox"/> Any service definition	Any service policy	CICSHI	1	1.8	5	1.3	15	System

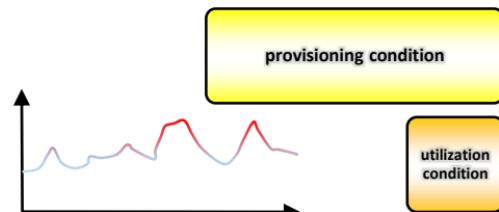
- Workload Conditions specify which Service Class performance **may** trigger activations

Policy – Provisioning Condition – Utilization Condition

- Alternative trigger for on-demand activations (**instead** of Workload Condition)
- monitors the physical processor utilization of the whole CPC
- CEC is eligible for processor activation whenever its utilization exceeds the given limit
- does not discriminate between causing system or workload

parameters

- target CPC
- processor type
 - differentiates between CP, zIIP (and zAAP)
- CPC utilization limit criteria
 - provisioning condition: utilization % limit and duration
 - de-provisioning condition: utilization % limit and duration



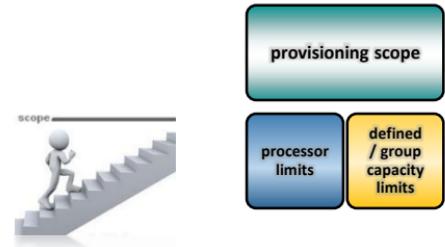
Policy & Processing parameters – additional criteria

- control **aggressiveness** of on-demand provisioning
 - added capacity per step and pace of successive steps
- adjust **additional preconditions** for on-demand provisioning
 - WLM PI not the only trigger for provisioning
- decide **how long** additional capacity should be **kept activated**
 - specify minimum duration of activation or last time possible for de-provisioning

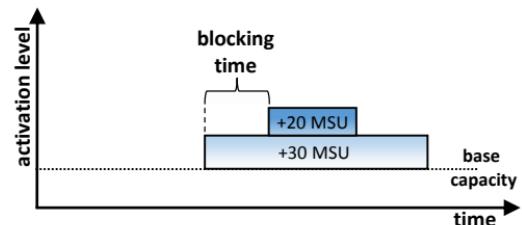


Policy & Processing parameters – additional criteria 1

- control **aggressiveness** of on-demand provisioning
- Provisioning Scope increments
 - tell by how many MSU to increment at least in each step

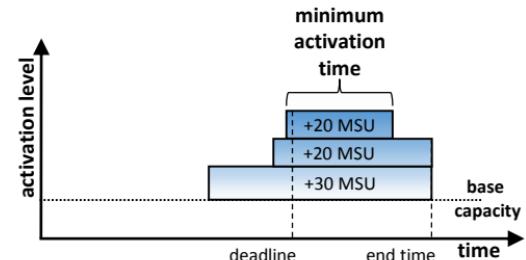
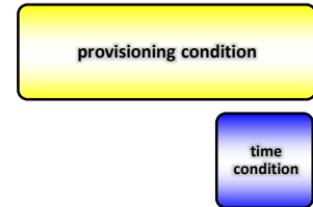


- PARM-key **BlockingTime**
 - define waiting period between each (de-)provisioning step
 - waiting period allows performance measurements to adapt to recent capacity changes



Policy & Processing parameters – additional criteria 2

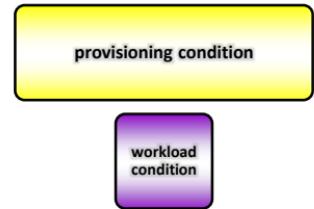
- activated capacity is normally deactivated as soon as de-provisioning criterion is fulfilled
 - **before deadline**: staged (de-)provisioning of additional capacity if necessary
 - **before end time**: staged de-provisioning of unneeded activated capacity
 - **after end time**: de-provisioning of all activated capacity at once
- de-provisioning can be delayed
 - PARM-key `MinimumActivationTime`
 - allows to keep already ‘payed’ capacity for a longer period
- de-provisioning can be enforced before a certain time
 - suitable combination of time condition’s *deadline* and *end time* together with PARM-key `MinimumActivationTime`
 - could be aligned to your billing-period’s end



Policy & Processing parameters – avoid false positives

in your CPM Policy

- specify a high Provisioning PI limit
limit that the ServiceClasses' PerformanceIndex must exceed for triggering an activation
- specify a prolonged Provisioning duration
duration during which the PI must exceed the Provisioning PI limit



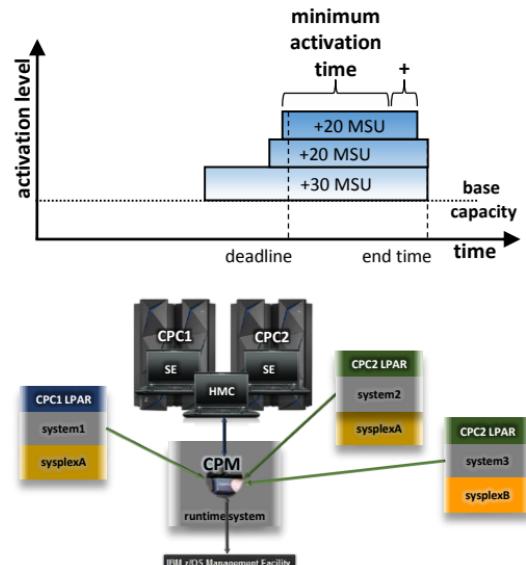
in the CPM Control Parameters

- by default, CPM will only activate OOCoD capacity if other measurements exceed certain thresholds
 - system's MVS busy must exceed 95%
adjustable with parameter Analyzer.Threshold.Mvsutilcp
 - CPC wide physical utilization must exceed 95%
adjustable with parameter Analyzer.Threshold.TotalSharedPhysicalUtilcp
 - amount of delay samples per monitoring interval must exceed 5
adjustable with parameter Analyzer.Threshold.ScpCPDelaySamples
 - ...and many more



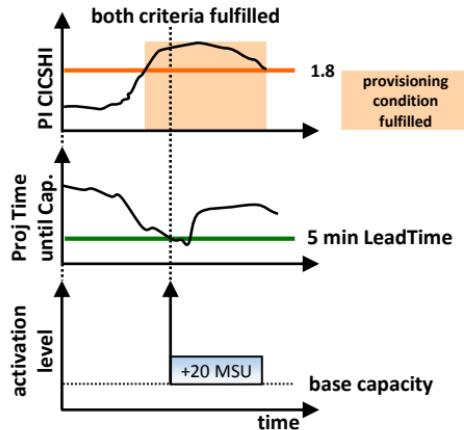
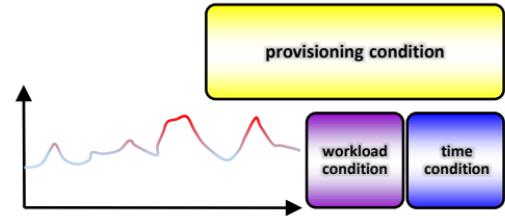
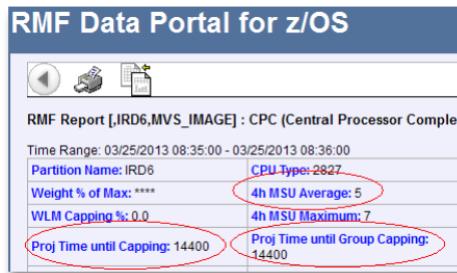
Policy – delaying or blocking de-provisioning

- activated capacity is normally deactivated as soon as de-provisioning criterion is fulfilled
- policy-driven de-provisioning can be delayed
 - command **MANAGE RESOURCE** to restart or change **MinimumActivationTime** for physical capacity
 - command **SET BASE** to restart or change **MinimumActivationTime** for Defined/Group Capacity
- policy-driven de-provisioning can be prevented
 - command **DISABLE CONFIGURATION CPC=x** temporarily takes server out of CPM's policy management
 - command **DISABLE CONFIGURATION SYS=x PLEX=y** temporarily takes system out of CPM's policy management



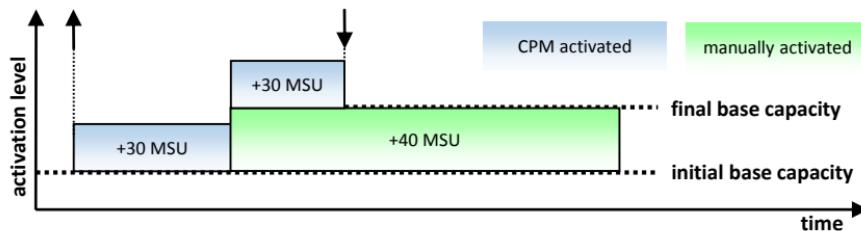
Policy – Provisioning Condition – on-demand foresight

- control how **foresighted Defined or Group Capacity** is activated
- primary activation trigger is detected business need from suffering workload according to the **provisioning condition**
- additional and necessary criterion**

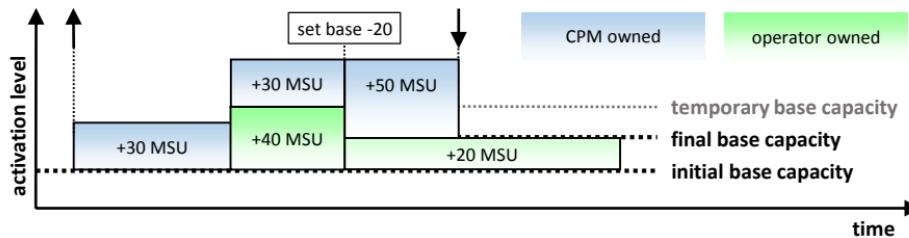


Concurrent CP and manual activations

- manual capacity changes may occur while CP has activated resources
- CP distinguishes between resources activated by itself or not so
- CP only de-activates capacity amount it has activated by itself



- command **SET BASE** lets hand over or to take away from CP management of Defined/Group Capacity portions



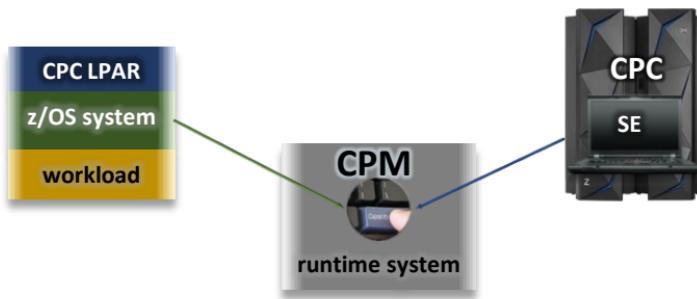
Other processing parameters

- exceeding activation threshold is **necessary** condition for on-demand provisioning, but **not sufficient**
 - CPM processing examines many metrics and parameters to ensure that
 - the observed performance bottleneck is caused by a capacity shortage of the respective type
 - additional capacity can actually be consumed by workload that incurred the capacity demand
- for many aspects of CPM processing, additional directives may be specified in PARM-member
 - minimum MVS-busy %
 - minimum CPC-utilization %
 - ... and many more
 - refer to documentation for published list
- (de-)provisioning pace and duration under control of additional parameters
 - `BlockingTime`, `MinimumActivationTime`, `LeadTime`



Overview of observed metrics

LPAR/system metrics	CPC metrics	Service Class metrics	Support Element data
<ul style="list-style-type: none">WLM Service Definition, Policy, Service Classesshared / dedicated procs.Defined Capacity & Initial Cappingcapping effective & time until capping4h rolling average MSUdispatchable units (InR queue)IRD weight & vary CPU mgmt. <p><u>per processor type</u></p> <ul style="list-style-type: none">online CPs, zAAPs, zIIPsreserved processorsLPAR weightMVS & LPAR utilization	<ul style="list-style-type: none">Group Capacity <p><u>per processor type</u></p> <ul style="list-style-type: none">shared physical utilizationtotal logical processorstotal weightsphysical processors	<ul style="list-style-type: none">local PI & sysplex PI% capped# delay samples <p><u>per processor type</u></p> <ul style="list-style-type: none">processor delaysTCB, SRB	<ul style="list-style-type: none">H/W modelspare processorsInstalled OOCoD records incl. validity, activation limits, current activation levelcurrent S/W modelcurrent number of processorspower saveevent subscriptionscapacity and accounting changecommand completions



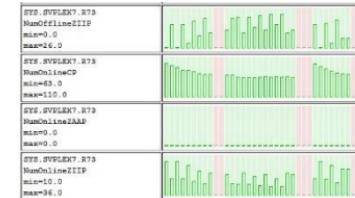
Agenda

Capacity Provisioning's field of activity
infrastructure & processing modes
configuration & operation
management examples
reports, logs & audit trails
V2R3 enhancements
links & documentation



Reports, logs & audit trails

- history of actual workload and system activity available with CPM reports
 - especially REPORT WORKLOAD , REPORT ACTIVITY
 - available at z/OS console and some in z/OSMF Capacity Provisioning task
 - can be directed to files and archived
- history of capacity changes available via CPM logging
 - metrics, decisions and other can be logged to file system
 - binary format, can be made readable out by z/OS service
- other information available
 - RMF Mon III data sets
 - model and capacity changes recorded outside CPM
 - SMF22
 - RMF 70.1, 72
 - capacity information via STSI instruction and MVS programming interfaces



Reports – management domain overview

Configuration Report: overview of your Domain Configuration objects

- observed systems

- whether system is currently observed
- current WLM service definition
- Defined Capacity or Group Capacity of system's LPAR

- managed CPCs

- current H/W model
- basic OOCoD information

```
/MODIFY CPOSERV,APPL=REPORT CONFIGURATION

CPO1010I Configuration report generated at 12/18/2015 18:15:00
...
System TESTSYS1 in sysplex TESTPLX1 is enabled (default enabled)
Primary host address: testsys1.yourdomain.com
Alternate host address: 9.123.456.789
Protocol: HTTP, port: 5988
The system at primary host address is observed
  This system is available since 02/05/2015 16:46:32
  This system is running on the CPC CPC2
  WLM service definition: SAMPLESD, active policy: SAMPLEP
  LPAR LPAR1 in capacity group TESTGRP3 with 270 MSU
The system at alternate host address is not observed
```

Reports – physical capacity management status

Record Report: physical processor data of managed CPCs

- management status
- activated capacity
- capacity share managed by CPM
- additional capacity allowed by OOCoD record

/MODIFY CPOSERV,APPL=REPORT RECORD CPC=G14								
CPO4430I Record report generated at 12/10/2015 16:04:34								
Record Id:	A0123456 (On/Off CoD)							
CPC name:	G14							
Management state:	provisioned, deprovisioning blocked							
until	13/10/2015 02:12:51							
Expiration date:	12/31/2015 23:59:59							
Active resources:	145 MSU, 0 zAAPs, 0 zIIPs 0 IFLs, 0 ICFs, 0 SAPs							
Managed resources:	1 CPS, 0 CLIs, 0 zAAPs, 0 zIIPs							
Activation time:	01/02/2015 06:45:00							
Activation limits:	3 zAAPs, 3 zIIPs 3 IFLs, 3 ICFs, 3 SAPs							
Residual capacity:	150 MSU days, 4 zAAP days, 5 zIIP days 1 IFL days, 1 ICF days, 1 SAP days							
Allowed models:								
Model	CP	CLI	MSU original	MSU absolute	MSU relative	MSU managed	Activation type	
505	0	0	0	240	-145	--	MAN	
506	1	0	39	279	-106	--	MAN	
605	0	1	52	292	-93	--	MAN	
507	2	0	77	317	-68	--	MAN	
606	1	1	99	339	-46	0	MAN	
705	0	2	123	363	-22	--	MAN	
607	2	1	145	385	0	46	PM	
706	1	2	182	422	37	--	--	
707	2	2	239	479	94	--	--	

Reports – Defined Capacity management status

Defined Capacity Report: observed system's LPAR Defined Capacity data

- current CPM management state
- allowed additional capacity as defined by policy
- CPM share of currently active capacity
- current capacity
- remaining time until potential capping (Proj Time until Capping) & 4HRA measurements

can be issued
by either specifying
system and sysplex or
LPAR and CPC names

```
/MODIFY CPOSERV,APPL=REPORT DEFINEDCAPACITY SYS=TESTSYS3 PLEX=PLX3

CPO1095I Defined capacity report generated at 12/18/2015 18:15:55
Defined capacity for LPAR TESTLP3 on CPC TESTCPC3
  Management state: increased
  Policy limit: 175 additional MSU
  Management base: 40 MSU
  Managed capacity: 160 additional MSU
  Current capacity: 200 MSU
  Remaining time until capping: 500 seconds
  4 hour rolling average: 193 MSU
```

Reports – Group Capacity management status

Group Capacity Report: observed system's LPAR Group Capacity data

- Capacity Group & CPC name
- current CPM management state
- allowed additional capacity as defined by policy
- CPM share of currently active capacity
- current capacity

can be issued
by either specifying
system and **sysplex** or
group and **CPC** names

```
/MODIFY CPOSERV,APPL=REPORT GROUPCAPACITY SYS=TESTSYS1 PLEX=TESTPLX1

CPO1096I Group capacity report generated at 12/18/2015 18:15:30
Group capacity for system TESTSYS1 in sysplex TESTPLX1
  Group name: TESTGRP3
  CPC name: CPC2
  Management state: increased, decrease blocked
                    until 12/18/2015 18:25:00
  Policy limit: 50 additional MSU
  Management base: 250 MSU
  Managed capacity: 20 additional MSU
  Current capacity: 270 MSU
```

Reports – demand detection explained

Workload Report: Workload Condition based on-demand detection

- policy limits and current measurements
- recognized demands grouped by resource type
- explanation for unrecognized demands giving failed criteria

can be **filtered**
by **observed system** or
by **suffering workload**

```
/MODIFY CPOSERV,APPL=REPORT WORKLOAD TYPE=DETAILED
CPO1005I Workload report generated at 12/18/2015 18:04:19
workload is analyzed for 1 system(s)
workload for system PROD1 of sysplex PRODPLEX on CPC CPC1
  CICSHI.1 PL/PD/DL/DD/S 1.8 5 1.2 15 System
    PI from 12/18/2015 17:02 is 2.76
      Last limit crossing was 12/18/2015 17:47
      Demand for additional physical zIIPs not recognized
      System zIIP-utilization too low
      Demand for additional physical zAAPs not recognized
      System zAAP-utilization too low
      Demand for additional defined capacity recognized
      Demand for additional physical CPs not recognized
      Demand for capacity level increase not recognized
      Demand for additional logical CPs not recognized
      CPC-wide CP-utilization too low
```

Reports – alternate demand detection explained

Utilization Report: Utilization Condition based on-demand detection

- policy limits and current measurements
- recognized physical demands

can be filtered
by observed system or
by suffering workload

can be **filtered**
by **managed CPC**

```
/MODIFY CPOSERV,APPL=REPORT UTILIZATION

CPO1022I CPC utilization report generated at 11/17/2015 08:21:22

Utilization is observed for 1 CPC(s)
CPC CPC1: utilization from 11/17/2015 08:20
  CP 92.6%, zAAP -%, zIIP -%
  Utilization condition UC1
    PU/PD/DU/DD/PT 91.7% 2 33.3% 15 CP
    Last CPC utilization threshold crossing was at 11/17/2015 08:17
    Demand for additional physical CPS recognized
    Demand for capacity level increase recognized
```

Reports – management history

Activity Report: past capacity changes details

- managed resource
- changed capacity
- time of change
- demand inducing policy element, system, workload

can be **filtered**
by **period of time**

```
/MODIFY CPOSERV,APPL=REPORT ACTIVITY

CPO1042I Activity report generated at 11/17/2015 07:51:47

Number of activities between 11/15/2015 and 11/17/2015 was 1
Activation for LPAR LPAR1 on CPC CPC1 at 11/16/2015 07:33:10
Activation of 25 MSU
Capacity after activation: 75 MSU
Capacity before activation: 50 MSU
Inducing policy element is policy SAMPPOL, rule ENDOFMONTN,
provisioning condition WEEKEND, time condition SatSunDay
Inducing system is PROD1 in sysplex PRODPLEX
Inducing workload is WLM service definition PRODDEF,
policy PRODPOL, service class period CICSHIGH.1
```

Agenda

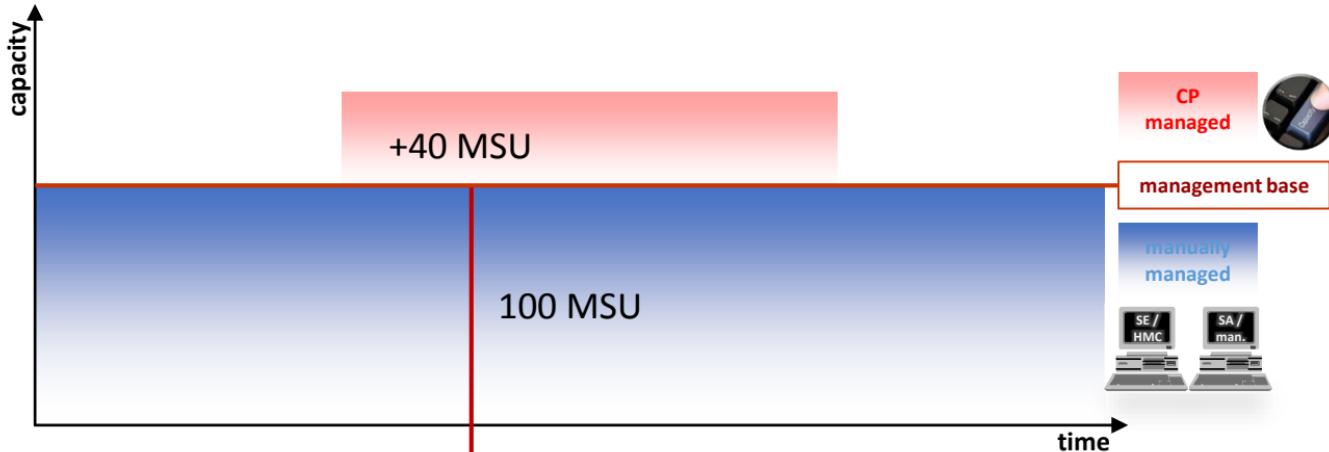
Capacity Provisioning's field of activity
infrastructure & processing modes
configuration & operation
management examples
reports, logs & audit trails
V2R3 enhancements
links & documentation



Concurrency of CP and manual management

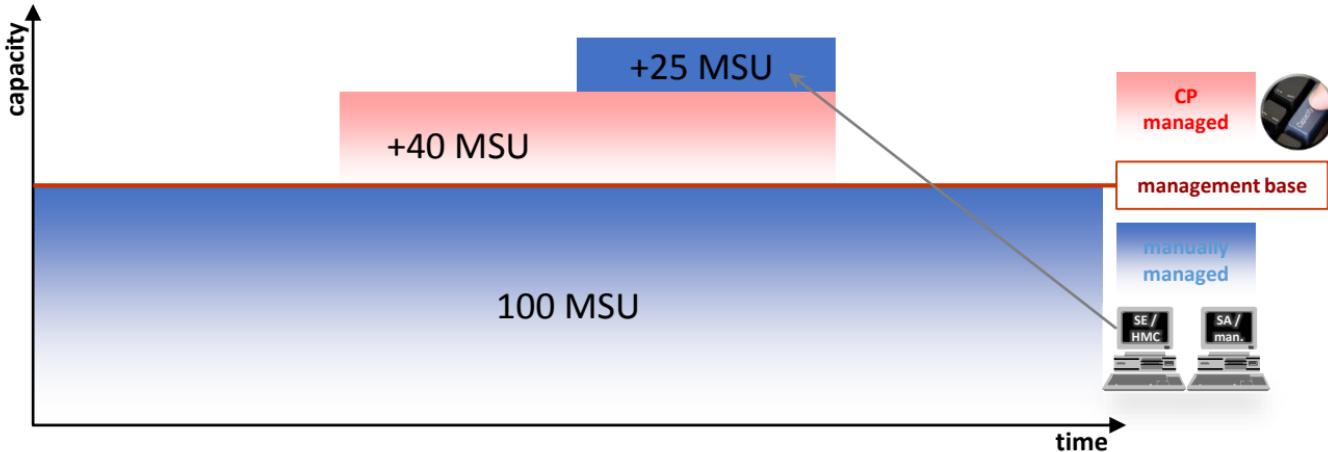


CP and manually managed capacity – 1



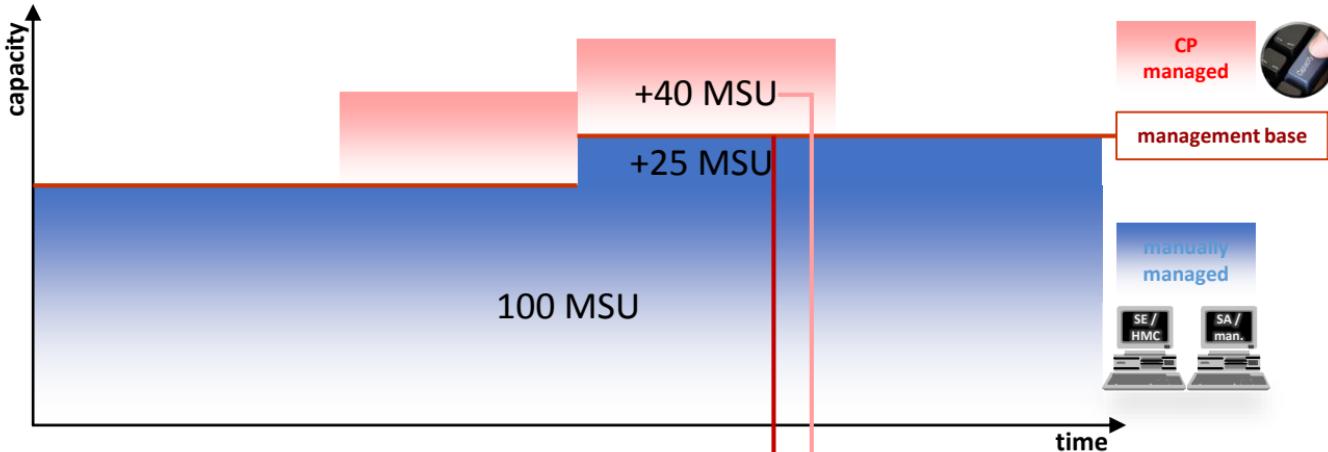
```
CP01095I Defined capacity report generated at 06/18/2016 18:15:30
Defined capacity for LPAR PROD1 on CPC Z13A
...
Management state: increased, decrease blocked until
06/18/2016 18:35:05
Policy limit: 75 additional MSU
Management base: 100 MSU
Managed capacity: 40 additional MSU
Current capacity: 140 MSU
```

CP and manually managed capacity – 2



```
CP01095I Defined capacity report generated at 06/18/2016 18:15:30
Defined capacity for LPAR PROD1 on CPC Z13A
...
Management state:      increased, decrease blocked until
                      06/18/2016 18:35:05
Policy limit:          75 additional MSU
Management base:       100 MSU
Managed capacity:      40 additional MSU
Current capacity:      140 MSU
```

CP and manually managed capacity – 3

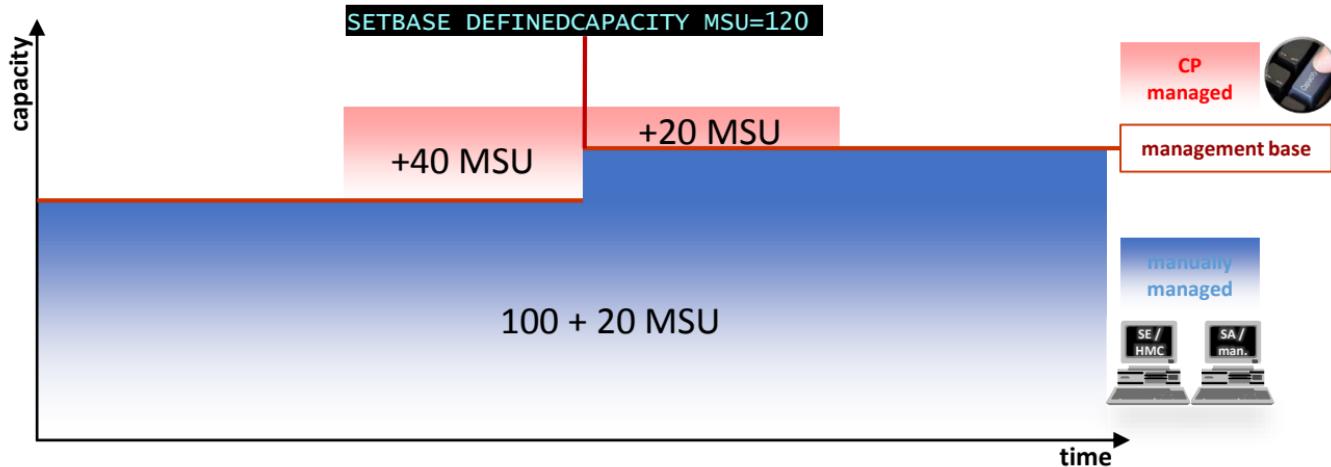


```
CP01095I Defined capacity report generated at 06/18/2016 18:21:50
Defined capacity for LPAR PROD1 on CPC Z13A
...
Management state:      blocked until
                      06/18/2016 18:36:11
Policy limit:          75 additional MSU
Management base:       125 MSU
Managed capacity:      40 additional MSU
Current capacity:      165 MSU
```

Hand over of Defined and Group Capacity

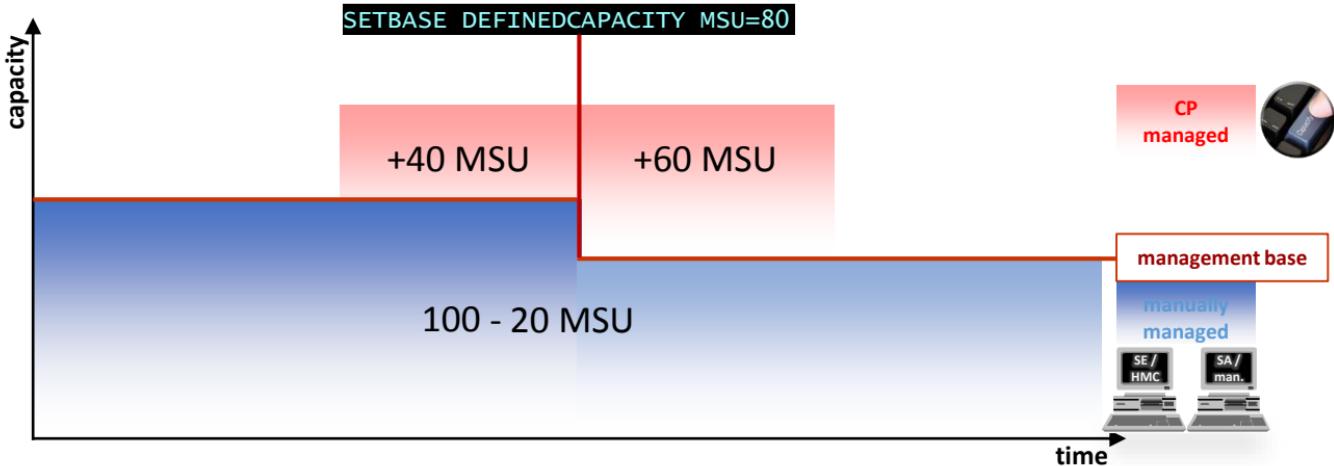


Raise the management base with SET BASE



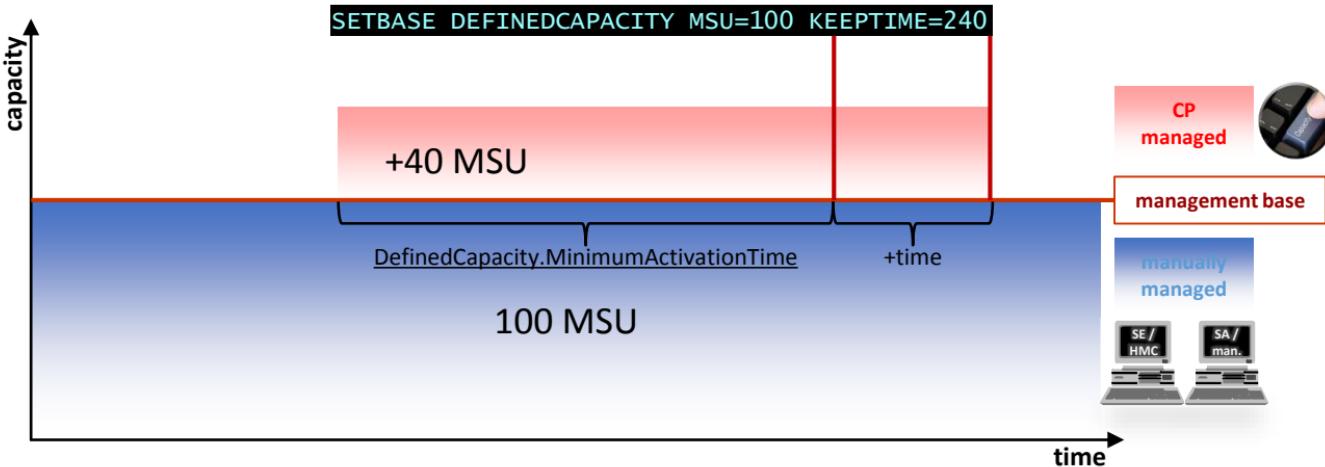
```
CP01095I Defined capacity report generated at 06/18/2016 18:21:12
Defined capacity for LPAR PROD1 on CPC Z13A
...
Management state:      blocked until
                      06/18/2016 18:23:43
Policy limit:          75 additional MSU
Management base:       120 MSU
Managed capacity:      20 additional MSU
Current capacity:      140 MSU
```

Lower the management base with SET BASE



```
CPO1095I Defined capacity report generated at 06/18/2016 18:21:12
Defined capacity for LPAR PROD1 on CPC Z13A
...
Management state:      blocked until
                      06/18/2016 18:23:43
Policy limit:          75 additional MSU
Management base:       80 MSU
Managed capacity:      60 additional MSU
Current capacity:      140 MSU
```

Prolong capacity activation with SET BASE



```
CP01095I Defined capacity report generated at 06/18/2016 18:21:12
Defined capacity for LPAR PROD1 on CPC Z13A
...
Management state:      increased, decrease blocked until
                        06/18/2016 22:20:43
Policy limit:          75 additional MSU
Management base:       100 MSU
Managed capacity:      40 additional MSU
Current capacity:      140 MSU
```

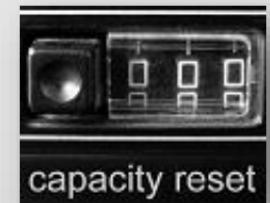
Benefit from SET BASE to immediately



take over Defined Capacity management from CP



hand over Defined Capacity to CP for further management



reset CP management of Defined Capacity



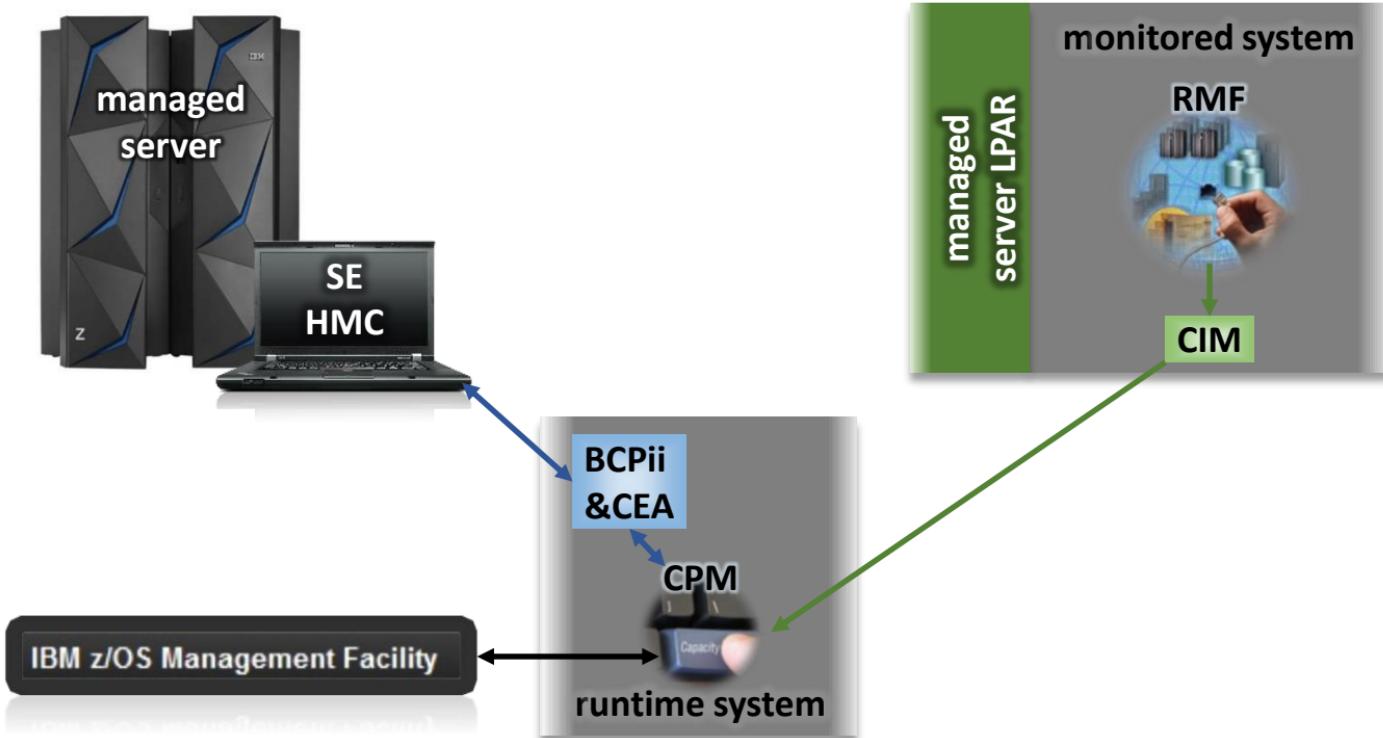
prolong CP managed Defined Capacity activation

influence already initiated CP Defined Capacity management

Enhance CP management domain availability



Capacity Provisioning Manager infrastructure



CPM reporting availability incidents up to z/OS V2R2

```
CPO2001I Provisioning Manager starting at 07/31/2017 07:22 for Domain IRD  
with policy * and mode *
```

```
CPO2016I Provisioning Manager successfully initialized. Policy is PROD3Q17,  
Configuration is PRODCFG1,  
and Processing Mode is AUTONOMIC
```

```
CPO3850E Unable to connect to CIM server at  
http://prodsys1.yourdomain.com:5989
```

```
CPO3019I Information for CPC Z13A available
```

```
CPO3027I Defined capacity information for CPC Z13A is available
```

incident message not up to date or displaced by subsequent messages

Availability status in Configuration Report

```
CPO1010I Configuration report generated at 07/31/2017 07:53:12
```

```
...
```

```
System PRODSYS1 in sysplex PRODPLEX is enabled  
(default enabled)
```

```
Primary host address: prodsys1.yourdomain.com
```

```
Alternate host address: 123.456.789.000
```

```
Protocol: HTTP, port: 5989
```

```
The system at primary host address is observed
```

```
This system is unavailable since 07/31/2017 07:22:00
```

```
This system is not yet initialized
```

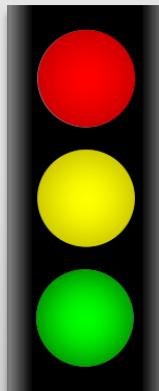
```
This system is not identified
```

```
...
```

```
End of report
```

causal analysis of availability incidents is missing

New CP health report – availability status at a glance



Error

CPO3850E Unable to connect to CIM server

Warning

CPO2135W Waiting for CPC information

OK

Health Report on system console

```
/MODIFY CPOSERV,APPL=REPORT HEALTH TYPE=DETAILED
```

CPO1094I Health status report generated at
07/31/2017 07:58:02

Overall health: 67%

...
CPC Z14A health: OK

...
System PRODSYS1 Sysplex PRODPLEX health:
Unavailable

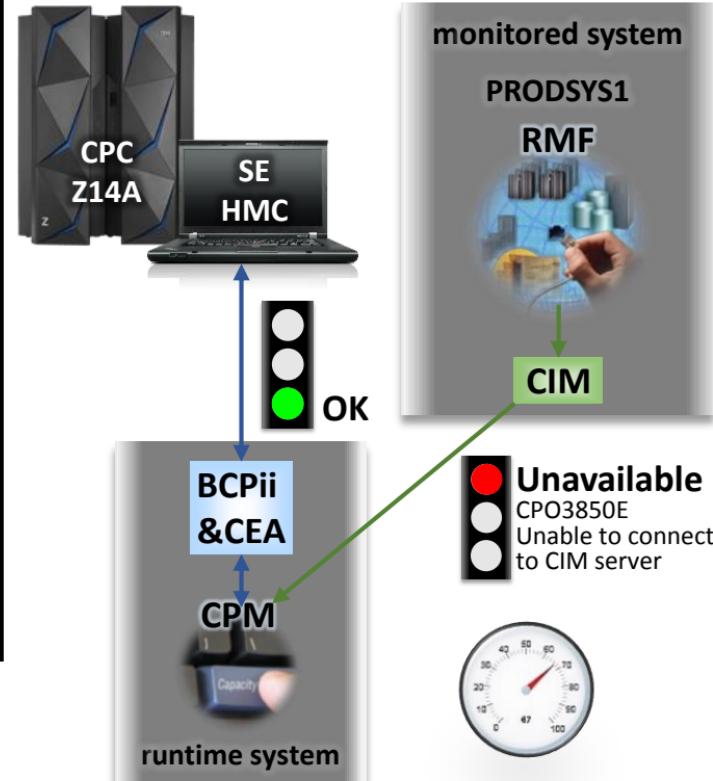
CPO3850E Unable to connect to CIM server at
<http://prodsys1.yourdomain.com:5989>

CPO3802W The system at address
prodsys1.yourdomain.com is unavailable

...
System PRODSYS3 Sysplex PRODPLEX health: OK

...
End of report

availability status & analysis per management object
+ overall health status %



Health Report on z/OSMF CP

IBM Knowledge Center

English ?

IBM Knowledge Center Full View

z/OSMF messages > CPO1001-CPO9999 > CPO messages > CPO3850E

CPO3850E Unable to connect to CIM server at address

Explanation

Unable to connect to the CIM server at the specified address. Possible reasons may be that the system is not running, the CIM server is not started, or a network problem.

User response

Ensure that the system and the CIM server are running and/or correct network problems.

Parent topic: [CPO messages](#)

© Copyright IBM Corp. 2009, 2017. Build 20170215.

System Filter	Sysplex Filter		
PRODSYS1	IRD4PLEX	Error	CPO3850E
PRODSYS3	IRD4PLEX	OK	

© Copyright IBM Corporation 2018

88

Health alerting function

configure CPM to alert of overall health status changes

CPM parameter Health.ChangeMessage=YES

CP02133I The Provisioning Manager health changed from 50% to 67%

monitor message CP02133I by automation for further steps

Benefits of Health alerting and REPORT HEALTH



be notified quickly
about availability problems

CPO2133I The Provisioning Manager
health changed from 50% to 67%

The screenshot shows a search result for 'CPO messages'. The top result is a link to 'CPO3850E Unable to connect to CIM server at address'. The page content includes the error message, an 'Explanation' section stating it's due to a network problem, a 'User response' section suggesting to check the system and CIM server, and a 'Parent topic' section for 'CPO messages'. A copyright notice at the bottom indicates the page was last updated in 2017.

obtain further
problem related
CPO message
information

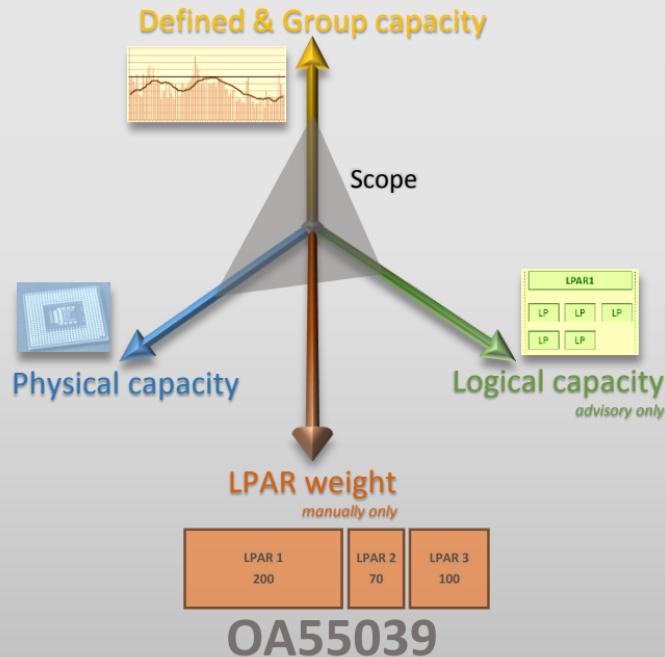
correlate
reported problems
to managed servers
or monitored systems



Error
CPO3057E
Unable to connect
to CPC Z14A

higher availability of management domain = increased CP reliability

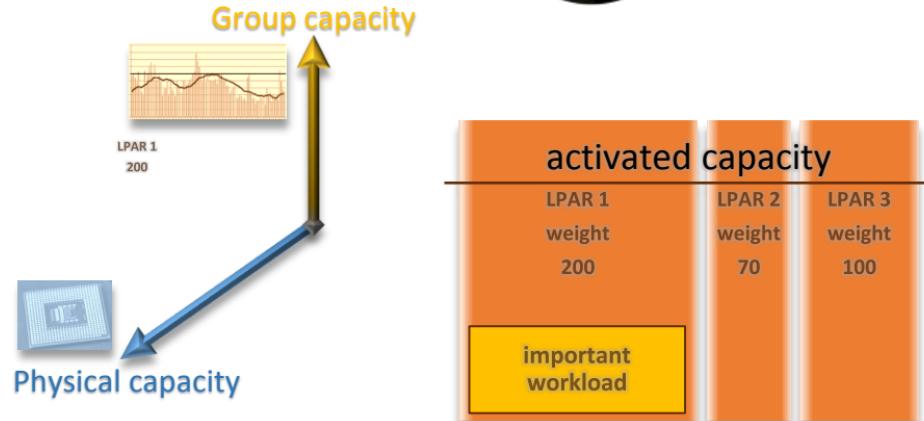
LPAR weight adjustment with CPM



The shared capacity 'dilemma'

shared resources are distributed amongst participating LPARs according to their uncapped weight ratio

- **Group Capacity**
relative to all active LPARs belonging to the same capacity group
- **physical capacity**
relative to all active LPARs using the CECs shared processor pool



- activated shared capacity may not entirely benefit LPAR with requesting important workload

Need to favor suffering LPAR

- benefit only LPAR running suffering workload with almost all provisioned capacity
- redirect activated shared capacity to LPAR in need



activated capacity	LPAR 1 weight	LPAR 2 weight	LPAR 3 weight
	200	70	100
important workload			

Assign suffering LPAR increased share

- ‘dedicate’ activated shared capacity to LPAR in need



- increased weight for LPAR running suffering workload allows it to absorb additional capacity



CP assists you with new LPAR weight reporting and commands

LPAR weight information in Configuration Report

```
CPO1010I Configuration report generated at 04/23/2018 09:27:39
```

```
...
```

```
System PRODSYS1 in sysplex PRODPLEX is enabled  
(default enabled)
```

```
Primary host address: prodsys1.yourdomain.com
```

```
Alternate host address: 123.456.789.012
```

```
Protocol: HTTP, port: 5989
```

```
The system at primary host address is observed
```

```
This system is available since 04/20/2018 06:21:28
```

```
This system is running on CPC Z14A
```

```
WLM service definition: WLMSD1, active policy: WLMPOL1
```

```
LPAR PRODLPI with defined capacity of 200 MSU
```

```
LPAR PRODLPI in capacity group PRODGRP1 with 750 MSU
```

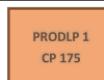
```
LPAR PRODLPI current weights CP/ZIIP/IFL 175/50/- WLM mgmt. off
```

```
CPC Z14A total weights CP/ZIIP/IFL 615/200/1952
```

```
The system at alternate host address is not observed
```

```
End of report
```

current LPAR weights of observed systems



other LPARs
CP 440

New LPAR Weight Report

```
/MODIFY CPOSERV,APPL=REPORT LPARWEIGHT CPC=Z14A
```

```
CPO1353I LPAR weight report generated at 04/23/2018 09:40:17
```

LPAR (current/initial)	CP	ZIIP	IFL	WLM managed
PRODLP1	150/150	35/ 35	0/ 0	no
PRODLP3	100/100	0/ 0	100/100	no
TESTLP1	50/ 20	15/ 15	100/100	yes
CPC Z14A total (current)	1250	100	220	
End of report				

initial & current weights of all* LPARs



* with BCPii authorization

New LPAR weight change command & reporting

```
/MODIFY CPOSERV,APPL=SET LPARWEIGHT LPAR=PRODLP1 CPC=Z14A CP=250
```

CPO1342I LPAR weight for CP processors on LPAR PRODLP1 on CPC Z14A changed to 250

CPO3930I LPAR weight change detected. New current weights are 250/35/- (CP/ZIIP/IFL) for LPAR PRODLP1 of CPC Z14A with system PROD1 in sysplex PRODPLEX. WLM management is disabled

change initial weights of all* LPARs



* with BCPii authorization

Other relevant CPM information for LPAR weight changes

```
CPO4430I Record report generated at 04/23/2018 09:42:39
```

```
...
```

```
Allowed models:
```

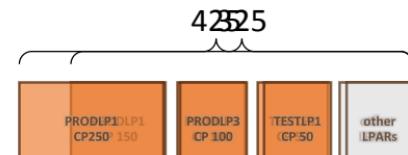
Model	CP	CLI	MSU original	MSU absolute	MSU relative	MSU managed	Activation type
703	0	0	0	620	-188	0	MAN
704	1	0	188	808	0	188	PM
705	2	0	370	990	182	370	--

```
End of report
```

$$\text{MSU: } 620 + 188 = 808 (+30\%)$$

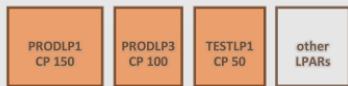
~

$$\text{Weight: } 325 + 30\% = 425$$



correlate MSUs and weight values

Benefits of weight reporting and SET LPARWEIGHT



request current & initial
LPAR weights

```
LPAR PRODLP1 current weight (total)  
CP:175(615) zIIP:50(200) IFL:*(1952)
```

```
CPO1353I LPAR weight report generated  
LPAR (current/initial) CP  
PRODLP1 150/100  
CPC Z14A current total 1250
```

adjust LPAR weights after
shared capacity changes



```
/MODIFY CPOSERV,APPL=SET LPARWEIGHT  
LPAR=PRODLP1 CPC=Z14A CP=250
```



be notified quickly about
LPAR weight changes

```
CPO3997I LPAR weight change detected. New current  
weights are 250/35/* (CP/zIIP/IFL) for LPAR PRODLP1  
of CPC Z14A with system PROD1 in sysplex PRODPLEX
```

favor LPARs with additional weight = dedicate shared resources to suffering workload

Documentation

- technical information: IBMCPCM@de.ibm.com
- website <http://www.ibm.com/systems/z/os/zos/features/cpm>
- z/OS MVS Capacity Provisioning User's Guide, SC34-2661-30
[https://www-304.ibm.com/servers/resourcelink/svc00100.nsf/pages/zosv2r3sc342661/\\$file/ieau100_v2r3.pdf](https://www-304.ibm.com/servers/resourcelink/svc00100.nsf/pages/zosv2r3sc342661/$file/ieau100_v2r3.pdf)
- IBM DEMOzone Demonstration of Capacity Provisioning
<http://www14.software.ibm.com/webapp/download/demo.jsp?id=IBM+z%2FOS+Capacity+Provisioning+Jan09>
- ITSO Redbook:
System z10 Enterprise Class Capacity on Demand, SG24-7504
<http://www.redbooks.ibm.com/abstracts/sg247504.html?Open>
- Capacity on Demand advancements on the IBM System z10,
IBM J. RES. & DEV. VOL. 53 NO. 1 PAPER 15 2009
<http://www.research.ibm.com/journal/abstracts/rd/531/axnix.html>

