System z196, z114 and z10 Capacity on Demand

Session 10869

Agenda

- The Basics - Capacity on Demand
- Elements of the Offerings
- Capacity Backup
- Capacity for Planned Events
- On/Off Capacity on Demand
- Capacity Provisioning Manager

Capacity on Demand

- **Permanent upgrade**
- **Temporary upgrade**
  - Replacement capacity
    - pre-paid
    - no additional IBM software charges
    - CBU, CPE
  - Billable capacity
    - post paid or pre-paid hardware (tokens)
    - involves also IBM software charges (post paid)
    - On/Off CoD

Ordered via ResourceLink or directly from IBM

The Big Picture – a new approach

- **Resources can be activated in any amount up to defined limit**
  - Customer can customize activation real-time, based on circumstances
  - Eliminates unique record to be managed for all possible permutations
  - Dynamic changes in activation level without reloading records
- **As records expire or are consumed, the resources will be deactivated**
  - System will not reduce to subcapacity when records expire
  - Will not deactivate if removing dedicated engines or last of that engine type
- **Various record limits can be dynamically updated / replenished**
  - Changes possible even if record is currently active
- **Ability to perform permanent upgrades while temporary capacity is active**
  - Allows quick conversion of temporary capacity to permanent
  - Permanent upgrade changes to allow for Purchase of unassigned CP or IFL capacity (z196/z114)
- **API enhancements to support use by Capacity Provisioning Manager**
  - Capacity Provisioning Manager provides policy based automation

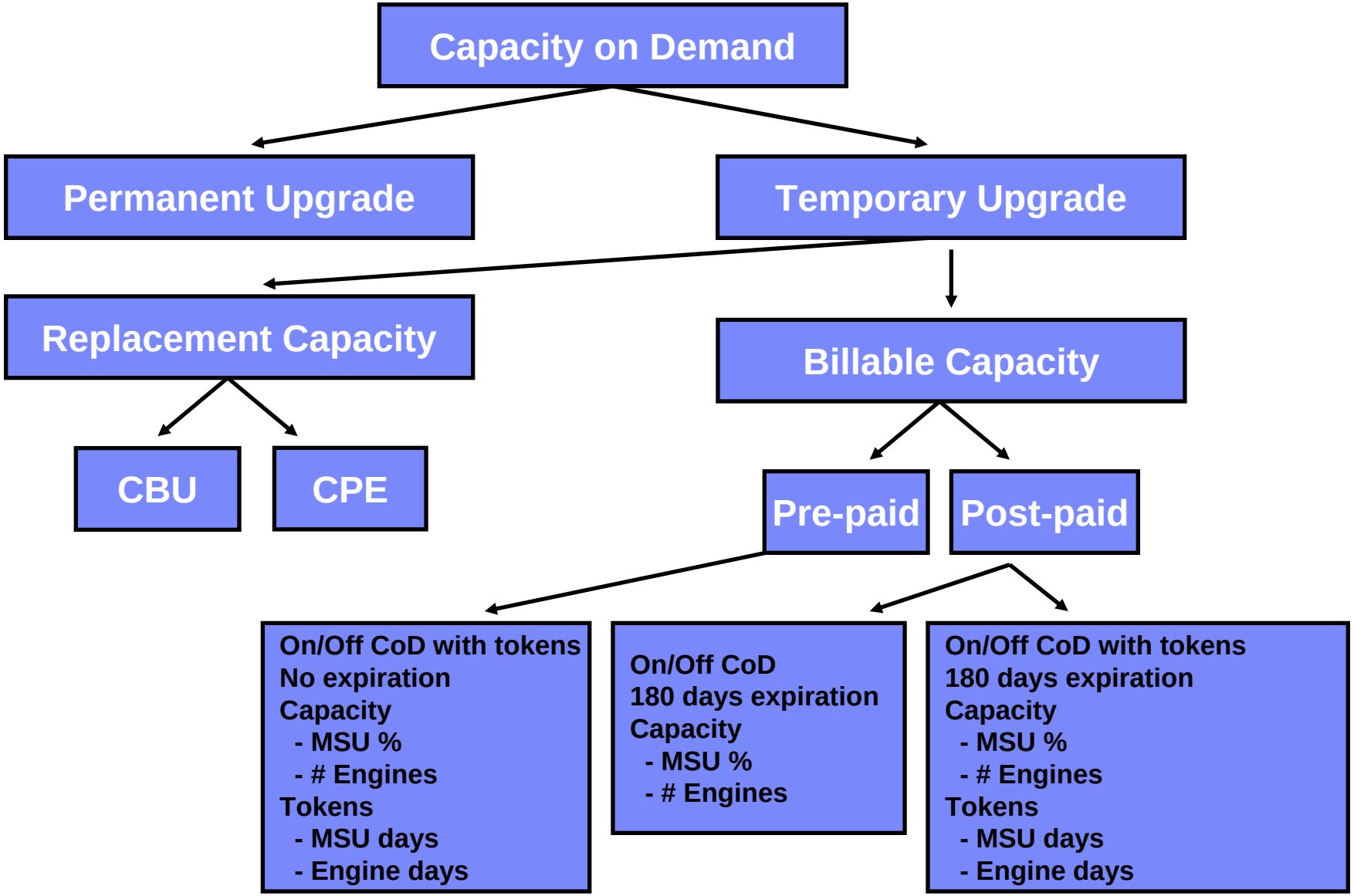
The Basics – Temporary Upgrades

- **Capacity Backup (CBU)**
  - Predefined capacity for disasters on a other “lost” server(s)
  - Concurrently add CPs, IFLs, ICFs, zAAPs, zIIPs, SAPs
  - Pre-paid

- **Capacity for Planned Events (CPE)**
  - CBU-like offering, when a disaster is not declared
  - Example: System migration (push/pull) or relocation (data center move)
  - Predefined capacity for a fixed period of time (3 days)
  - Pre-paid

- **On/Off Capacity on Demand (On/Off CoD)**
  - Satisfy periods of peak demand for computing resources
  - Concurrent 24 hour rental of CPs, IFLs, ICFs, zAAPs, zIIPs, SAPs
  - Supported through a new software offering – Capacity Provisioning Manager (CPM)
  - Post-paid or Pre-paid (tokens)

Basics of CoD



Tokens Overview

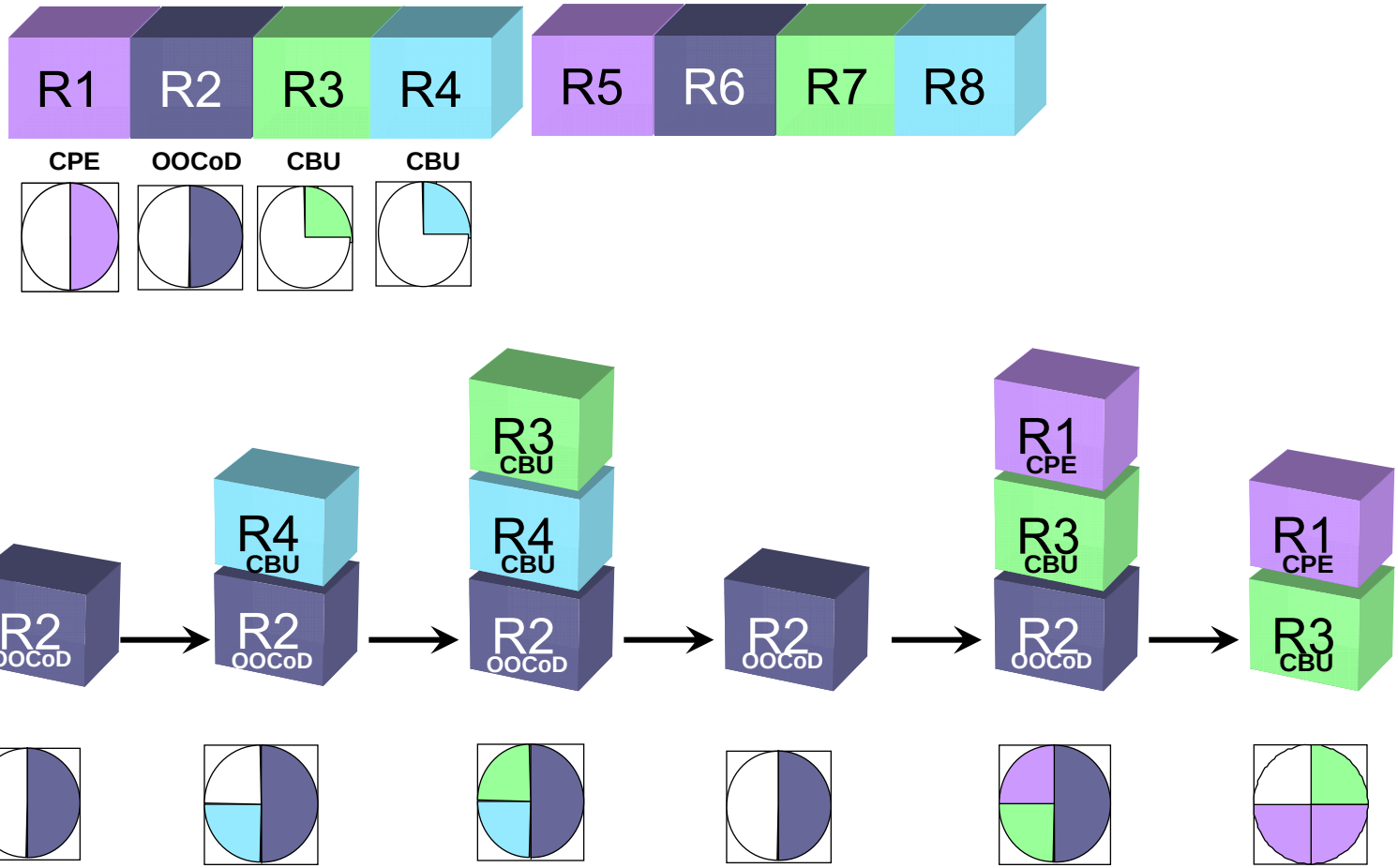
- **Pre-paid Offering**
  - Non-expiring
- **Post paid Offering**
  - To set spending limits on the offering record expires after 180 days
  - Can arranged to be replenished automatically (z196/z114).

- **Types of Tokens:**

- **Specialty engines: IFL/ICF/zIIP/zAAP/SAP Day tokens**
  - The specialty engine tokens to be billed per day equal the highest activation level for this resource during the current 24 hour billing window period
  - Example: if 5 zAAPs were the max activation level during this window, at the end of the window 5 zAAP tokens will be subtracted

- **CP MSU Tokens**
  - CP 1 MSU Token is used per MSU day per 24 hour period
  - Example: 86 additional MSU's for 300 days (86x300=25,800 MSU tokens)

Activation Sequence – examples



Capacity on Demand Comparisons (z10 versus zEnterprise)

	System z10	z196/z114
Auto renewal (On/Off CoD)	No	Yes
Administrative Tests (On/Off CoD)	No	Yes
Pre-load (install) up to four temporary records during manufacture	No	Yes
Permanent upgrade changes to allow for purchase of unassigned CP or IFL capacity	No	Yes

Expiration Date

- Definition: Last day a record is usable
  - Regardless of whether the record is installed, active or staged.

- Offering specific
  - CBU - quantity of FC 6817 (CBU years) from date of order *

    *** records ordered through manufacturing include 47 additional days to allow for fulfillment and installation of machine.**
  - On/Off CoD - 180 days from date of order

- GMT (UTC) vs. Local time
  - A record will expire and its associated resources made unavailable at 23:59 GMT on the date of expiration.
  - Resource Link sends out warning e-mails prior to expiration.

- Warning messages will begin at least 5 days prior to expiration for installed records
  - Warning messages appear on ResourceLink as well as the CoD panels on the HMC

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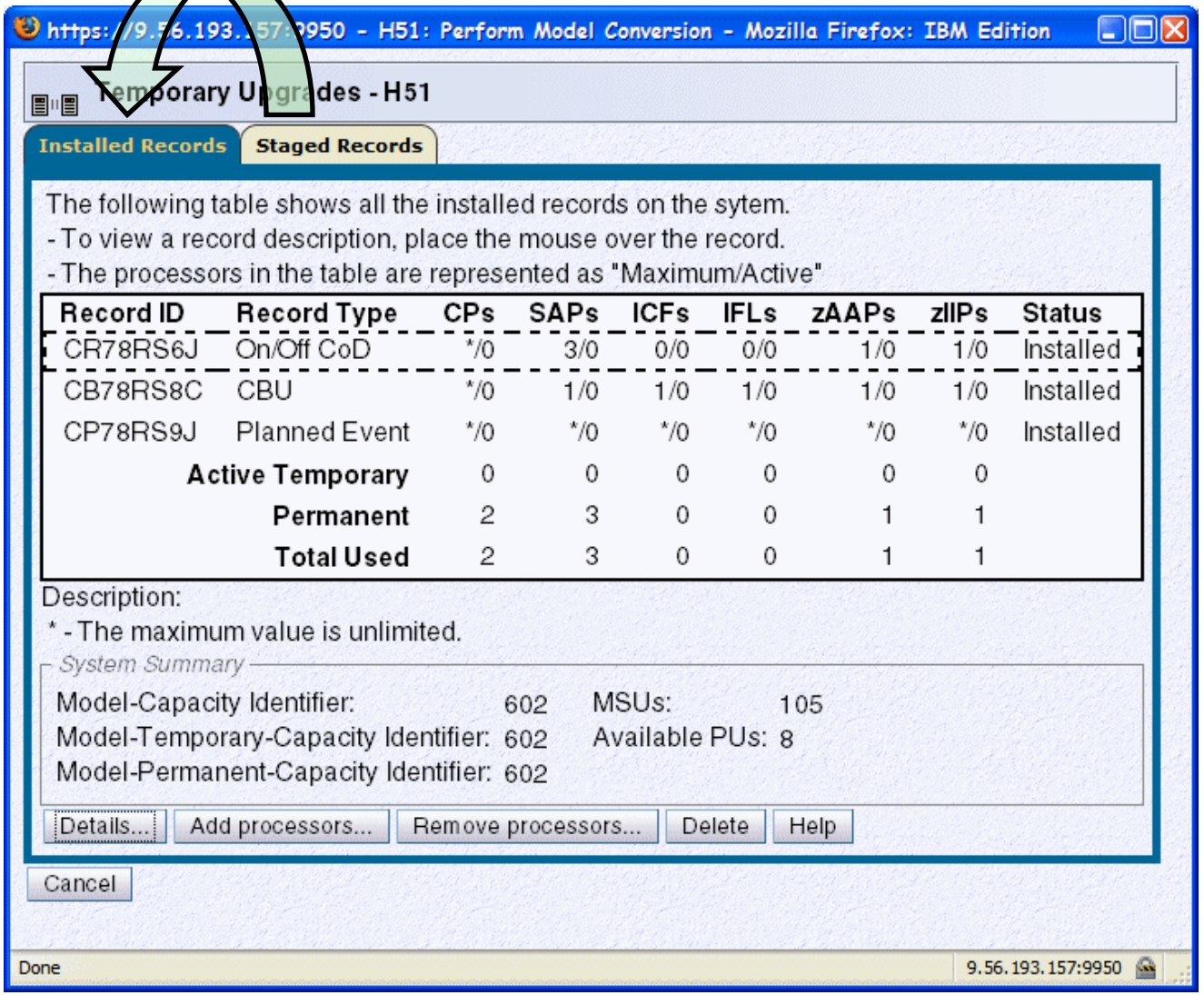
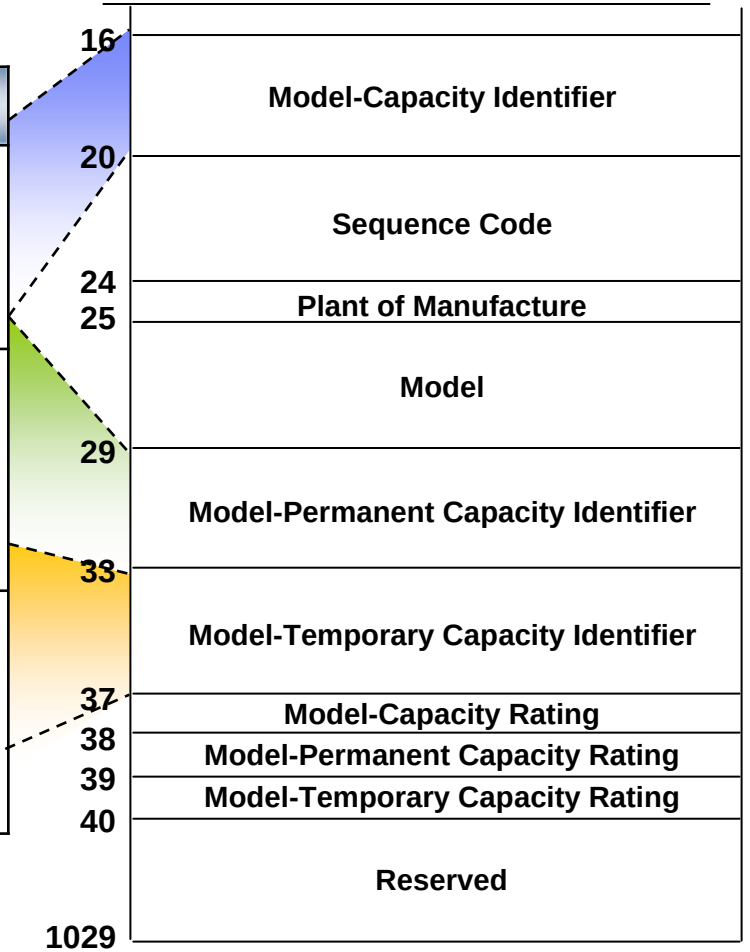
Installed and Staged CoD Records – (Perform Model Conversion ICON)

- Order and stage up to 200 records on the Support Element
- Records must be moved from Staged to Installed to use
- Install up to 8 records simultaneously



STore System Information (STSI) Enhancements

Capacity			
Model-Capacity Identifier	Base (not high water mark)	Billable (On/Off CoD)	Replacement (CBU,CPE)
Model-Permanent-Capacity Identifier	Base (not high water mark)		
Model-Temporary-Capacity Identifier	Base (not high water mark)	Billable (On/Off CoD)	



- Provide capacity ratings for license purposes that can be verified by STSI
- Facilitates the ability for programs to recognize On/Off CoD and CBU activity

Elements of the Offerings

Replenishments

Resources

Time elements

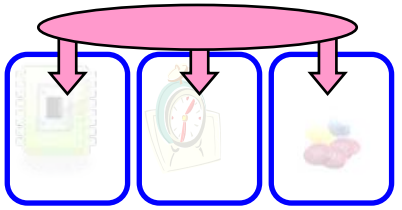
Tokens

Order process limits

Machine limits

Contract terms and conditions

Offering Parameters – 3 ways of handling



Resources - (order process limits)

- *Limit the amount of a particular resource that can be activated*
- *Absolute number which represents maximum resource entitlement*
- *Activation to resource limits may not be achieved depending on current configuration*
- *e.g. #CPs, #IFLs, #Capacity levels*

Time Elements - (machine limits)

- *Limit the length of time that the record can be active; full or partial (applies to all record types)*
- *All time limits are measured in days or calendar date*
- *Absolute number which represents maximum time entitlement*
- *e.g. Number of days in test, Number of days in real activation, calendar date*

Tokens - (terms and conditions)

- *Consumable – record updated each 24 hours to reflect consumption level*
- *Values are treated as incremental delta to the current token level*
- *e.g. number of tests, number of real activations*
- *Limits (new) for limiting financial exposure: pre-paid and post paid tokens*

NOTE: Negative updates to these limits are not allowed

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Capacity Backup – CBU

Resources

CP Capacity Features
Specialty engines:
zIIP, zAAP, ICF, IFL, SAP

Time elements

Test duration = 10 days
Real activation = 90 days
2 day grace period
Expiration date set to 1 through 5 years

Tokens

Number of Tests = number of CBU years ordered plus up to 10 additional (max=15)

Number of Real activations = 1

Order process limits

- Total CP Capacity features = number of net new engines + number of permanent engines changing capacity level
  - ►No limit to the resources ordered
- Number of zIIPs or zAAPs can not exceed total number of permanent + temporary CPs
- No more than 15 tests per record

Machine limits

- Can not decrement capacity level
- Can not remove permanent engines from configuration
- No Tests while in Real activation
- No Tests if number of Real activations equals zero
- Auto deactivation of activated resources upon time limit
  - ►If any resource can not be removed all resources stay active
  - ►Ability to remove resources checked every 24 hours

Contract terms and conditions

- To be used only for replacement capacity within an enterprise
- Priced for H/W. No IBM S/W charges

CBU Replenishment

Component	Replenish	Comments
Resources (CP, specialty engines)	Yes	
Used “real” activation	Yes	
Expiration date	~~No~~ Yes 	May 2009
CBU Tests	Yes	May 2009  Order additional tests in single increments limited by CBU record total tests <=15. eg. if 3 tests remain, order up to 12 additional tests (15 total tests)

Managing temporary capacity with GDPS V3.9 GDPS/PPRC, GDPS/XRC, GDPS/GM

- Adds/removes capacity for GDPS-managed CECs
  - GDPS already supports activation of a specific OOCoD LIC record
    - Only supports activation of the "default" CBU record.
- CBU and OOCoD activation status tracked at CEC level
  - New panel to view installed temporary capacity records
  - New panel to define named profiles for full or partial activation
    - CAPACITY script statement enhanced with extensive support for full and partial record activation/removal
      - All engine types (CP, SAP, zIIP, zAAP, ICF, IFL)
- CBU multiple LIC record support
  - Activate a specific LIC record for CBU without requiring operator intervention at the HMC to mark the desired LIC record as being the default.

CBU

- **CP capacity managed by feature codes**
  - Feature code either adds engine or increases capacity to a permanent engine
  - Total feature codes required = number of net new engines + number of permanent engines changing capacity

Use of CP CBU Feature Codes

z10 BC or z114 Example

1. **Increasing capacity of permanent engines**

   B02 → D02 *requires 2 CP_FCs to change capacity of 2 permanent CPs*

2. **Adding additional engines at same capacity**

   B02 → B05 *requires 3 CP_FCs to add 3 new engines at same capacity*

3. **Additional engines and increasing capacity of permanent engines**

   B02 → H04 *requires 4 CP_FCs which adds 2 new engines and a change of capacity of 2 permanent CPs*

Note: You can't decrease the number of CPs or decrease capacity setting –

Z01	Z02	Z03	Z04	Z05
Y01	Y02	Y03	Y04	Y05
X01	X02	X03	X04	X05
W01	W02	W03	W04	W05
V01	V02	V03	V04	V05
U01	U02	U03	U04	U05
T01	T02	T03	T04	T05
S01	S02	S03	S04	S05
R01	R02	R03	R04	R05
Q01	Q02	Q03	Q04	Q05
P01	P02	P03	P04	P05
O01	O02	O03	O04	O05
N01	N02	N03	N04	N05
M01	M02	M03	M04	M05
L01	L02	L03	L04	L05
K01	K02	K03	K04	K05
J01	J02	J03	J04	J05
I01	I02	I03	I04	I05
H01	H02	H03	H04	H05
G01	G02	G03	G04	G05
F01	F02	F03	F04	F05
E01	E02	E03	E04	E05
D01	D02	D03	D04	D05
C01	C02	C03	C04	C05
B01	B02	B03	B04	B05
A01	A02	A03	A04	A05
1-way	2-way	3-way	4-way	5-way

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T01	T02	T03	T04	T05
S01	S02	S03	S04	S05
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Q01	Q02	Q03	Q04	Q05
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B01	B02	B03	B04	B05
A01	A02	A03	A04	A05
1-way	2-way	3-way	4-way	5-way

Authorization space example CBU

base model C04

5 CP CBUs

Z01	Z02	Z03	Z04	Z05
Y01	Y02	Y03	Y04	Y05
X01	X02	X03	X04	X05
W01	W02	W03	W04	W05
V01	V02	V03	V04	V05
U01	U02	U03	U04	U05
T01	T02	T03	T04	T05
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D01	D02	D03	D04	D05
C01	C02	C03	C04	C05
B01	B02	B03	B04	B05
A01	A02	A03	A04	A05
1-way	2-way	3-way	4-way	5-way

Note: A CBU record could also include specialty engines. The z114 has a number of processing units (5 PU's) that are available beyond the 5 CP's shown here.

Authorization space example (z196)

base model 405

6 CP CBUs

7xx	701	702	703	704	705	706	707	708	709	710	711	712	713	714	715	716
6xx	601	602	603	604	605	606	607	608	609	610	611	612	613	614	615	
5xx	501	502	503	504	505	506	507	508	509	510	511	512	513	514	515	
4xx	401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	
N-way	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16

Authorization space example (z10 EC)

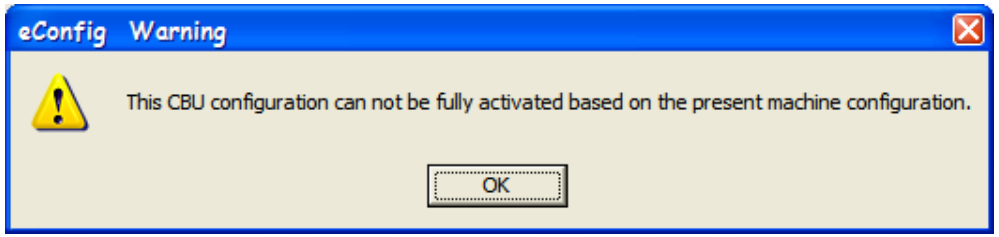
base model 504

5 CP CBUs

7xx	701	702	703	704	705	706	707	708	709	710	711	712	713	714
6xx	601	602	603	604	605	606	607	608	609	610	611	612		
5xx	501	502	503	504	505	506	507	508	509	510	511	512		
4xx	401	402	403	404	405	406	407	408	409	410	411	412		
N-way	1	2	3	4	5	6	7	8	9	10	11	12	13	14

z196 & z10 EC Model Dependency

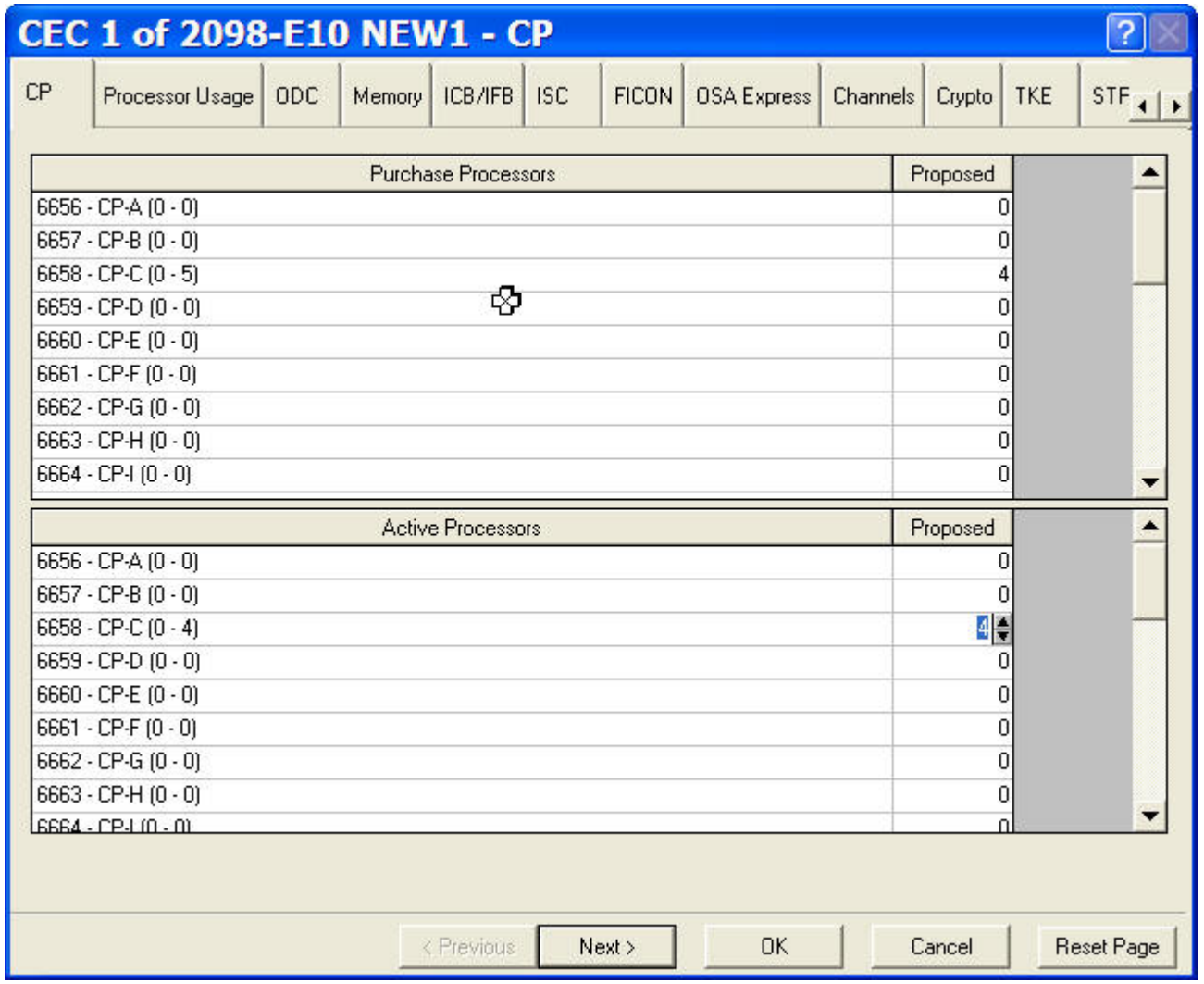
- Ensure there are enough books/PUs to support the target CBU destination



Z196 / z10 HW Model	Model Capacity Identifier
z196 - M15	**700 – 715, 6xx, 5xx, 4xx**
z10 - E12	**700 – 712, 6xx, 5xx, 4xx**
z196 - M32	**700 – 732, 6xx, 5xx, 4xx**
z10 - E26	**700 – 726, 6xx, 5xx, 4xx**
z196 - M49	**700 – 749, 6xx, 5xx, 4xx**
z10 - E40	**700 – 740, 6xx, 5xx, 4xx**
z196 - M66	**700 – 766, 6xx, 5xx, 4xx**
z10 - E56	**700 – 756, 6xx, 5xx, 4xx**
z196 - M80	**700 – 780, 6xx, 5xx, 4xx**
z10 - E64	**700 – 764, 6xx, 5xx, 4xx**

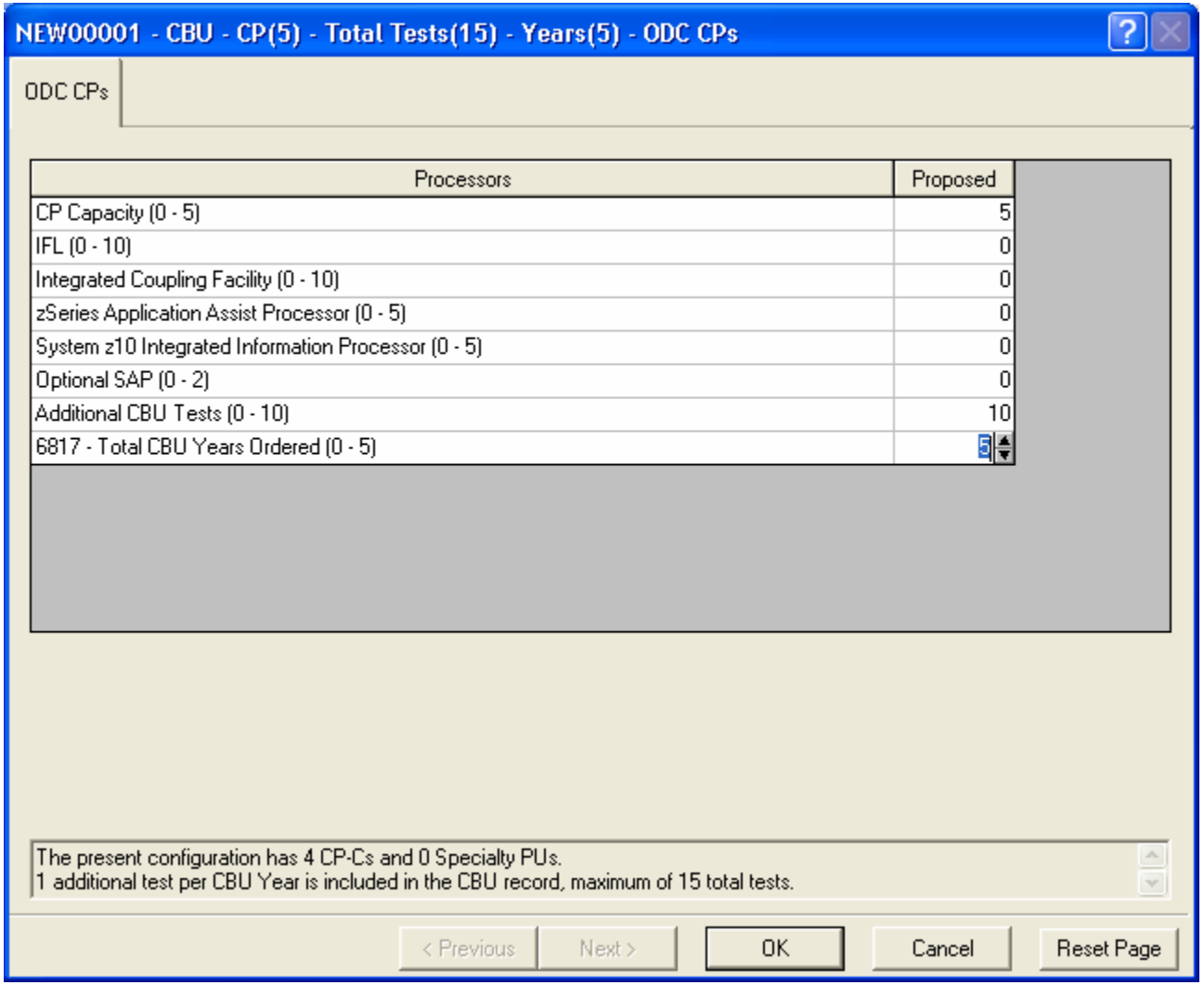
CBU Example in eConfig

- 2098-E10
- Base – C04

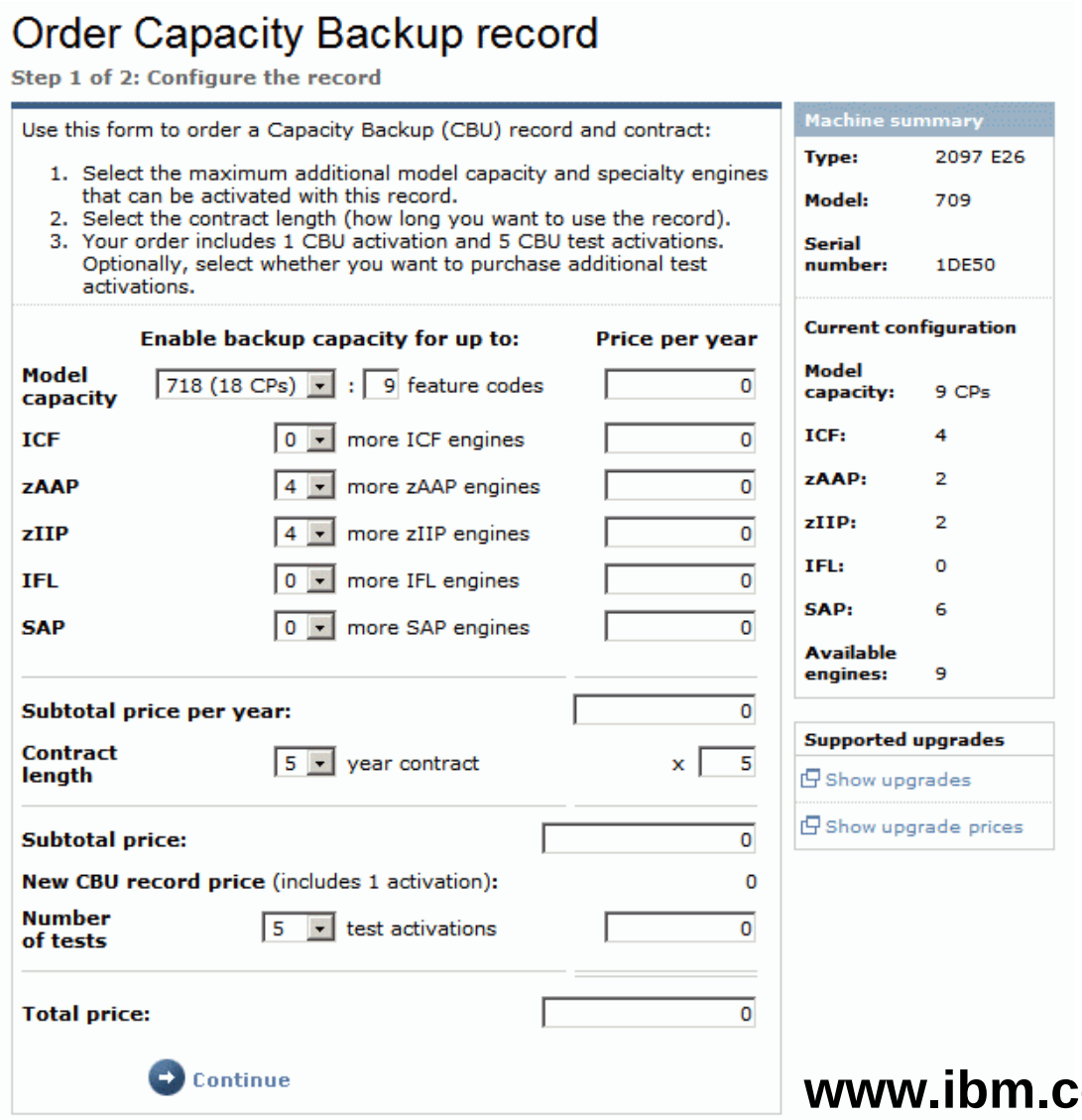


CBU Example

- 5 CBU CP's
- Five Year contract
- 10 additional Tests (total 15)



CBU Order Panel – ResourceLink



Order Capacity Backup record

Step 1 of 2: Configure the record

Use this form to order a Capacity Backup (CBU) record and contract:

1. Select the maximum additional model capacity and specialty engines that can be activated with this record.
2. Select the contract length (how long you want to use the record).
3. Your order includes 1 CBU activation and 5 CBU test activations. Optionally, select whether you want to purchase additional test activations.

	Enable backup capacity for up to:	Price per year
Model capacity	718 (18 CPs) : 9 feature codes	0
ICF	0 more ICF engines	0
zAAP	4 more zAAP engines	0
zIIP	4 more zIIP engines	0
IFL	0 more IFL engines	0
SAP	0 more SAP engines	0
Subtotal price per year:		0
Contract length	5 year contract	x 5
Subtotal price:		0
New CBU record price (includes 1 activation):		0
Number of tests	5 test activations	0
Total price:		0

Continue

Machine summary

Type:	2097 E26
Model:	709
Serial number:	1DE50

Current configuration

Model capacity:	9 CPs
ICF:	4
zAAP:	2
zIIP:	2
IFL:	0
SAP:	6
Available engines:	9

Supported upgrades

Show upgrades

Show upgrade prices

Needed:

On-line CoD buying

FC9900

CBU Authorization

FC9910

Contract signature

www.ibm.com/servers/resourcelink

CBU – Capacity Backup

- Example
  - Model C04
  - CBU max target= Z05
  - Add 5 CBU CPs
  - 5 Year Contract
  - 10 Additional tests
  - 5 x 5 = 25

On Demand Capacity Selections:

NEW00001 - CBU - CP(5) - Total Tests(15) - Years(5)

1 additional test per CBU Year is included in the CBU record, maximum of 15 total tests.

5027	4-Way Processor C04	1
6658	CP-C	4
6805	1 Additional CBU Tests	10
6817	1 CBU Year	5
6818	CBU	1
6821	25 CBU CP	1
6857	C04 Capacity Marker	1

Z01	Z02	Z03	Z04	Z05
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X01	X02	X03	X04	X05
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F01	F02	F03	F04	F05
E01	E02	E03	E04	E05
D01	D02	D03	D04	D05
C01	C02	C03	C04	C05
B01	B02	B03	B04	B05
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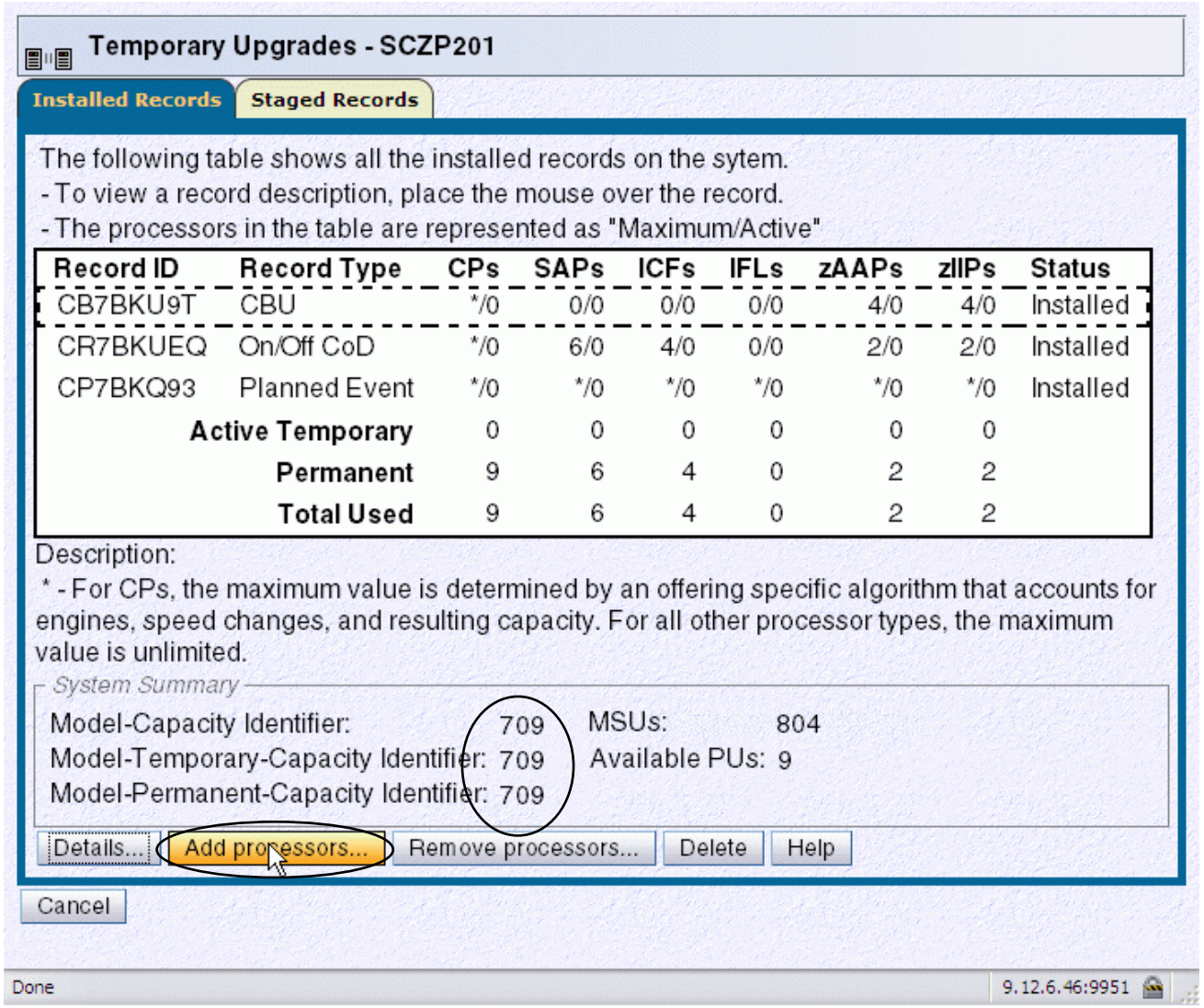
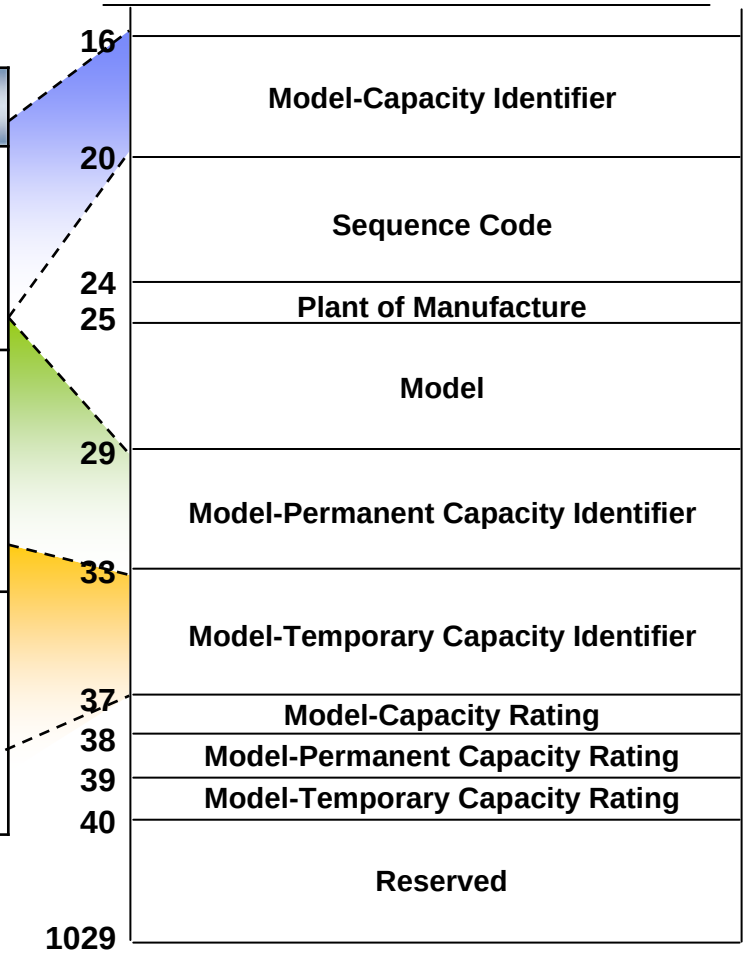
1-way	2-way	3-way	4-way	5-way

Permanent model 709



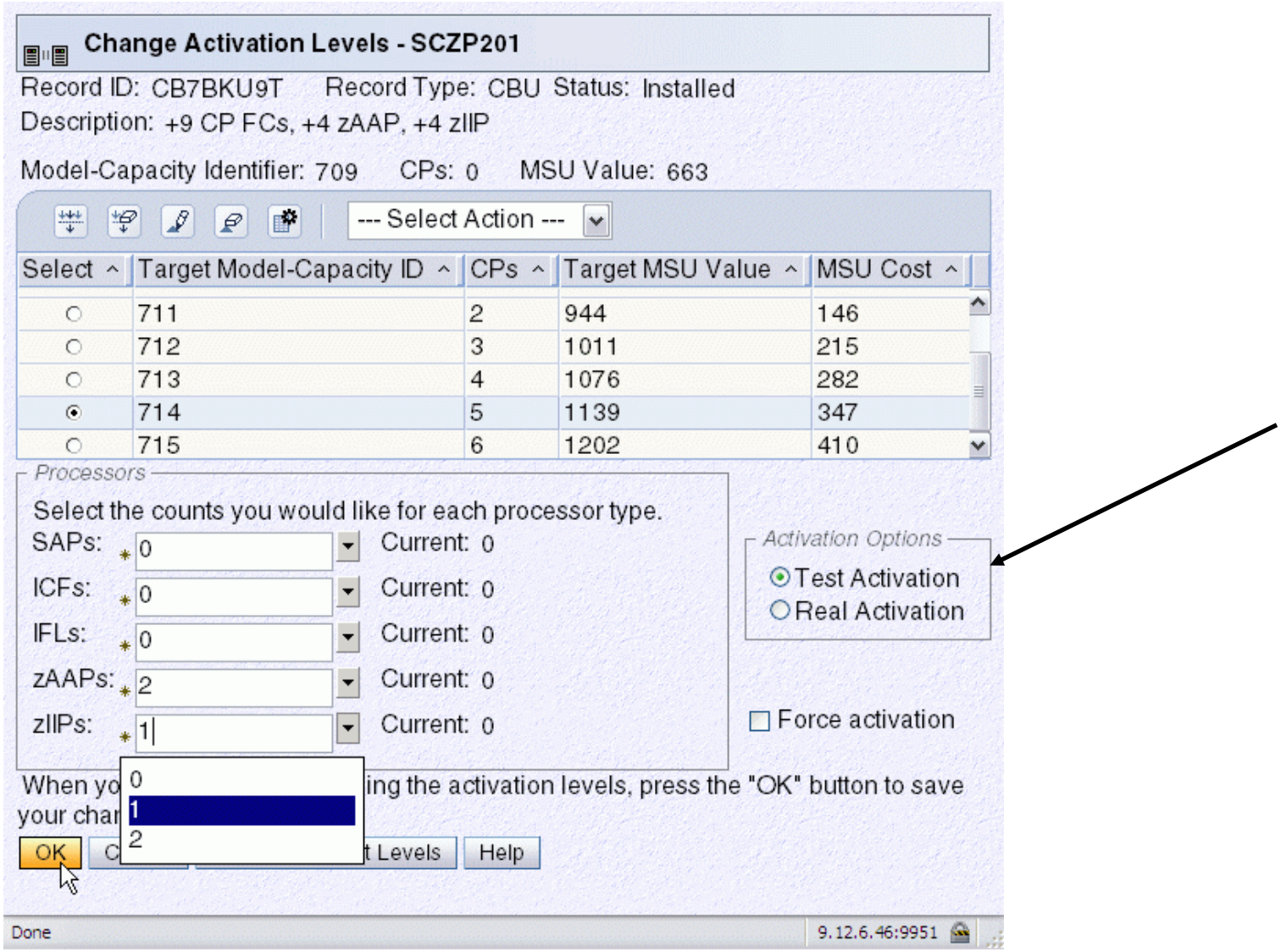
STore System Information (STSI) REVIEW

Capacity			
Model-Capacity Identifier	Base (not high water mark)	Billable (On/Off CoD)	Replacement (CBU,CPE)
Model-Permanent-Capacity Identifier	Base (not high water mark)		
Model-Temporary-Capacity Identifier	Base (not high water mark)	Billable (On/Off CoD)	

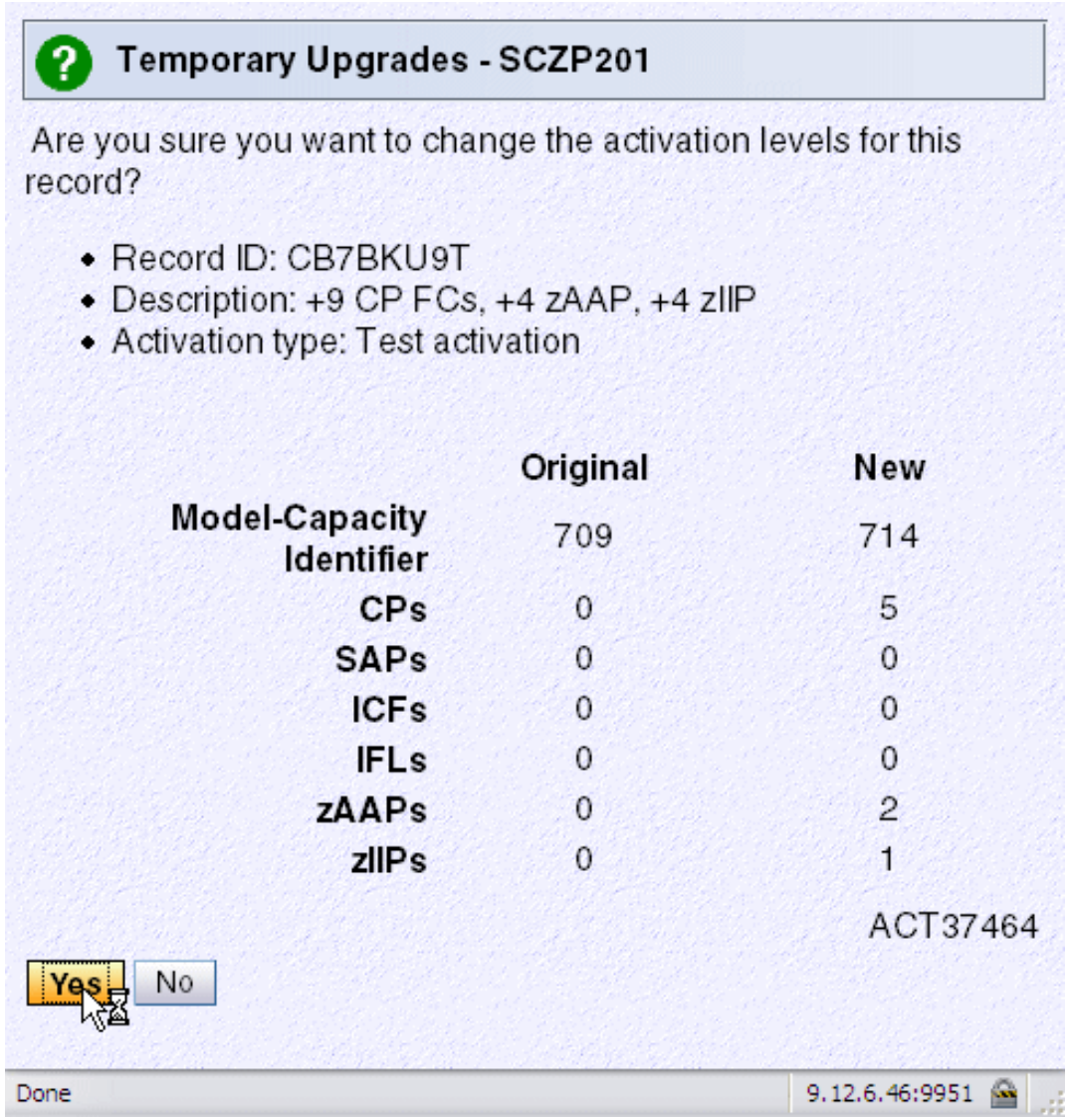


- Provide capacity ratings for license purposes that can be verified by STSI
- Facilitates the ability for programs to recognize On/Off CoD and CBU activity

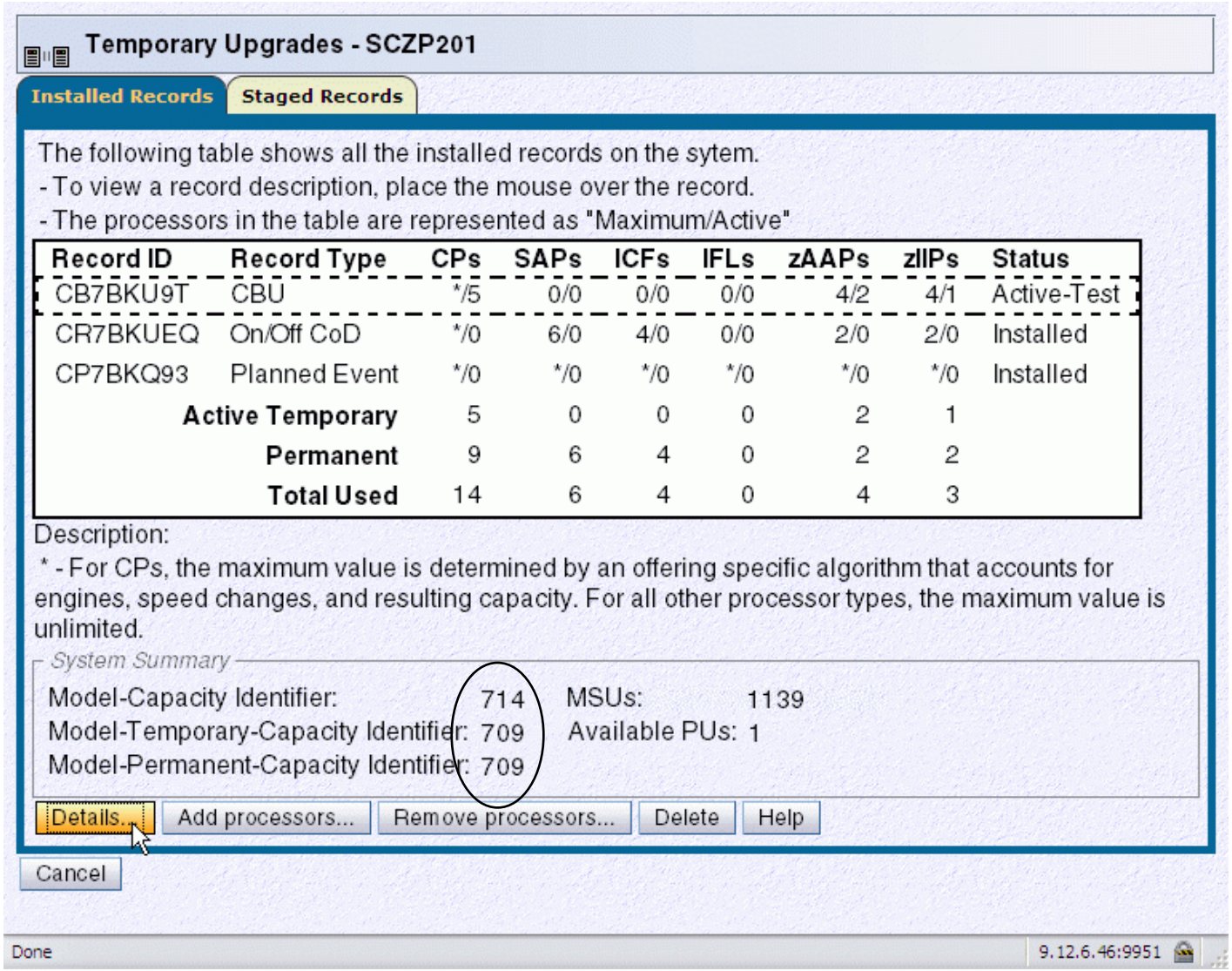
709 upgrade with CBU to 714



CBU Confirmation



Result



Temporary Upgrades - SCZP201

Installed Records | Staged Records

The following table shows all the installed records on the sytem.
- To view a record description, place the mouse over the record.
- The processors in the table are represented as "Maximum/Active"

Record ID	Record Type	CPs	SAPs	ICFs	IFLs	zAAPs	zIIPs	Status
CB7BKU9T	CBU	*/5	0/0	0/0	0/0	4/2	4/1	Active-Test
CR7BKUEQ	On/Off CoD	*/0	6/0	4/0	0/0	2/0	2/0	Installed
CP7BKQ93	Planned Event	*/0	*/0	*/0	*/0	*/0	*/0	Installed
	Active Temporary	5	0	0	0	2	1	
	Permanent	9	6	4	0	2	2	
	Total Used	14	6	4	0	4	3	

Description:
* - For CPs, the maximum value is determined by an offering specific algorithm that accounts for engines, speed changes, and resulting capacity. For all other processor types, the maximum value is unlimited.

System Summary

Model-Capacity Identifier: 714 MSUs: 1139
Model-Temporary-Capacity Identifier: 709 Available PUs: 1
Model-Permanent-Capacity Identifier: 709

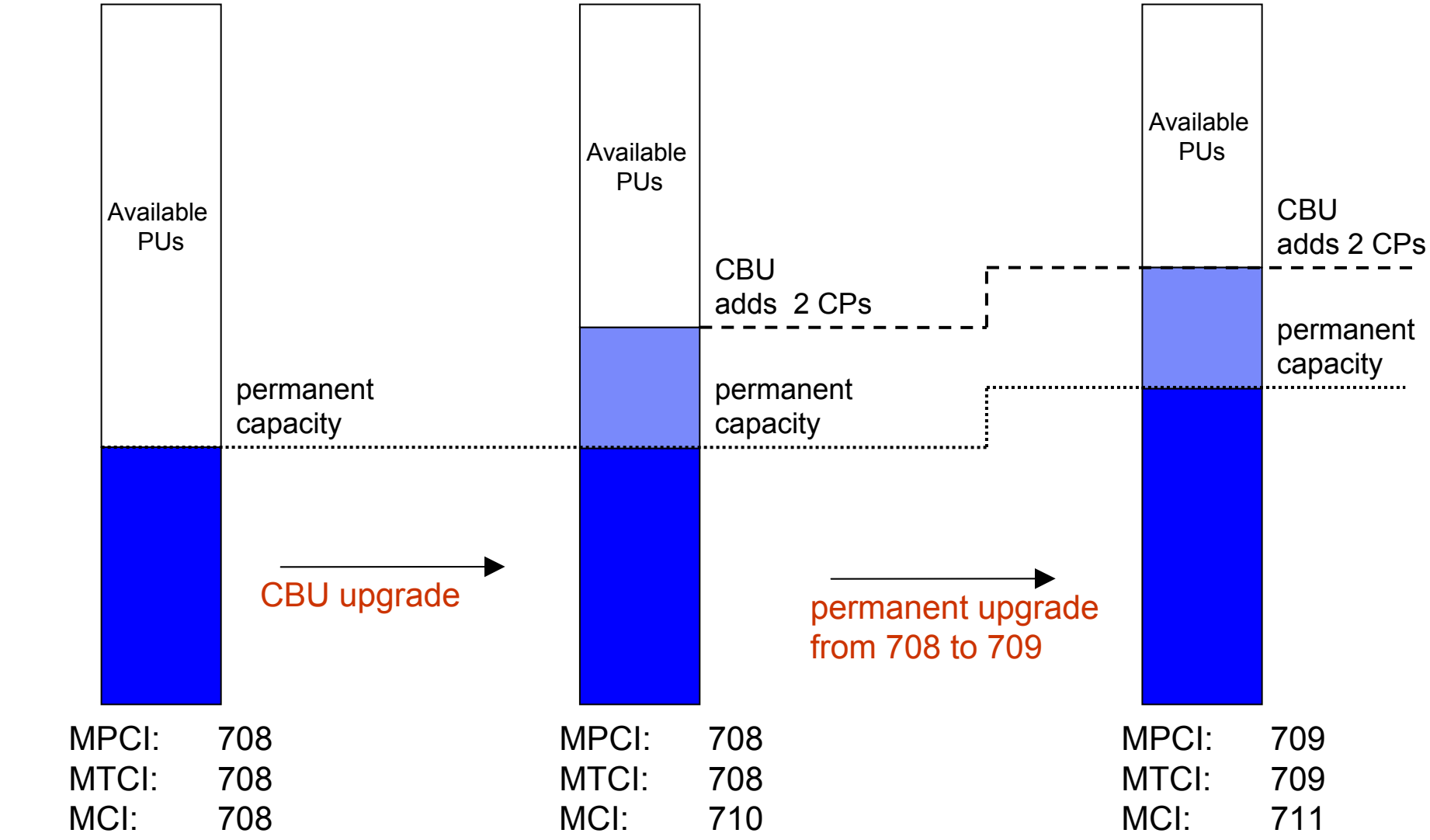
Details... | Add processors... | Remove processors... | Delete | Help

Cancel

Done 9.12.6.46:9951

Permanent Upgrade with CBU Active

CBU resources on top of new base. The base will increase if the resources are available, otherwise the permanent upgrade will be blocked until the resources are freed.



Comparison – z9 CBU versus z196/z114 & z10 CBU

	z9	z196, z114 & z10
Granularity	All on / All off	Granular
Customer exceeds terms	Reduce machine capacity	Removed automatically, if possible
Number of CBU orders	Buy one, apply one	Buy many, apply many simultaneously
Terms	Usually 5 years	Variable, 1-5 years

Agenda

- The Basics - Capacity on Demand
- Elements of the Offerings
- Capacity Backup
- Capacity for Planned Events
- On/Off Capacity on Demand
- Capacity Provisioning Manager

Capacity for Planned Events (CPE)

Resources

CP Capacity Features
Specialty engines:
zIIP, zAAP, ICF, IFL, SAP

Time elements

Test duration = NA
Real activation = 3 days
No grace period
No Expiration date

Tokens

Number of Tests = 0
Number of Real activations = 1

Order process limits

- No more than 1 real activation per record

Machine limits

- Can not decrement capacity level
- Can not remove permanent engines from configuration
- Auto deactivation of activated resources upon time limit
  - ►If any resource can not be removed all resources stay active
  - ►Ability to remove resources checked every 24 hours
- Ordered dormant resources are available for use during the activation

Contract terms and conditions

- To be used only for replacement capacity within an enterprise
- Priced for H/W use BUT like CBU, no IBM S/W charges

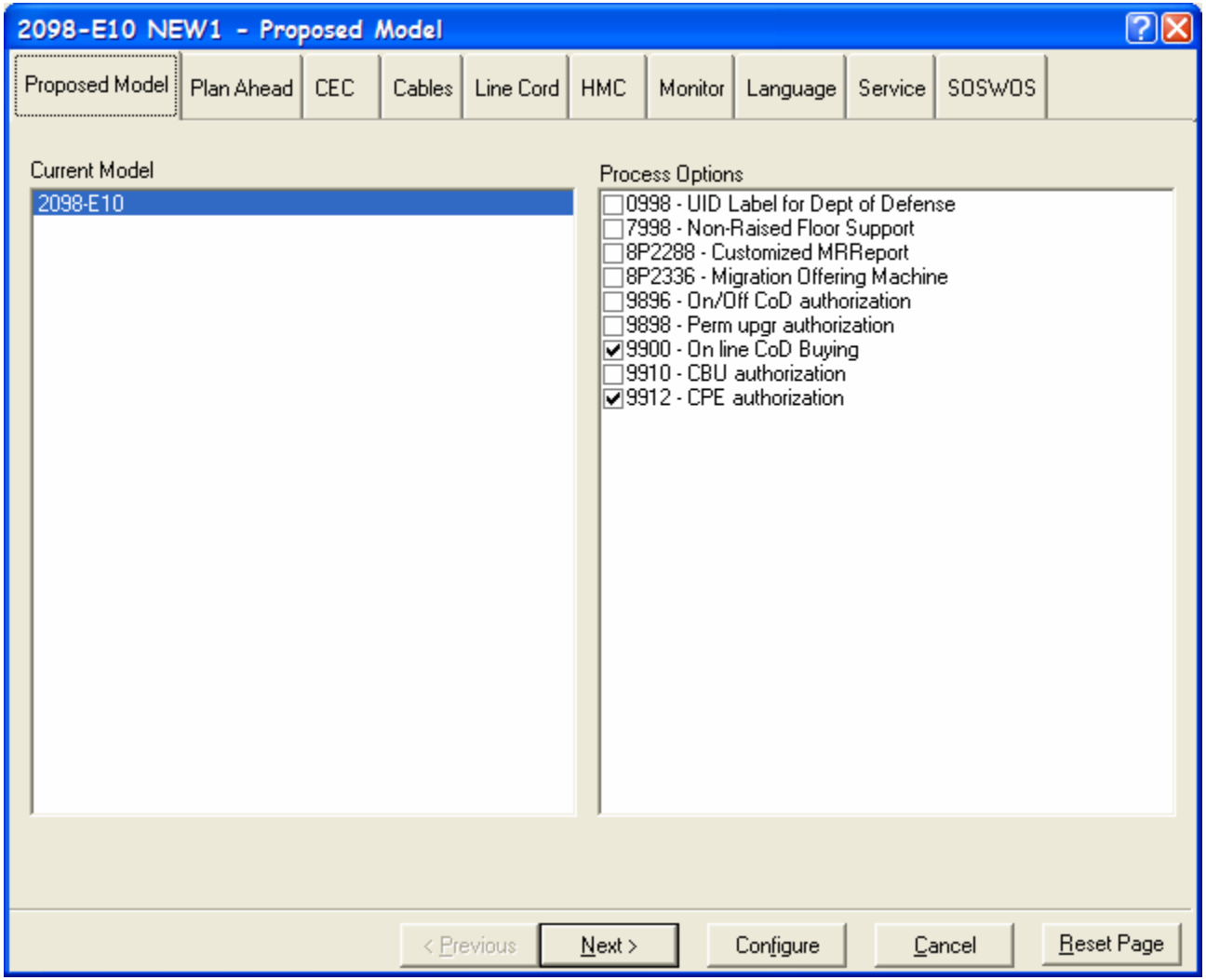
CPE Replenishment

Component	Replenish
Resources (CP, specialty engines)	No
Expiration date -	No

CPE

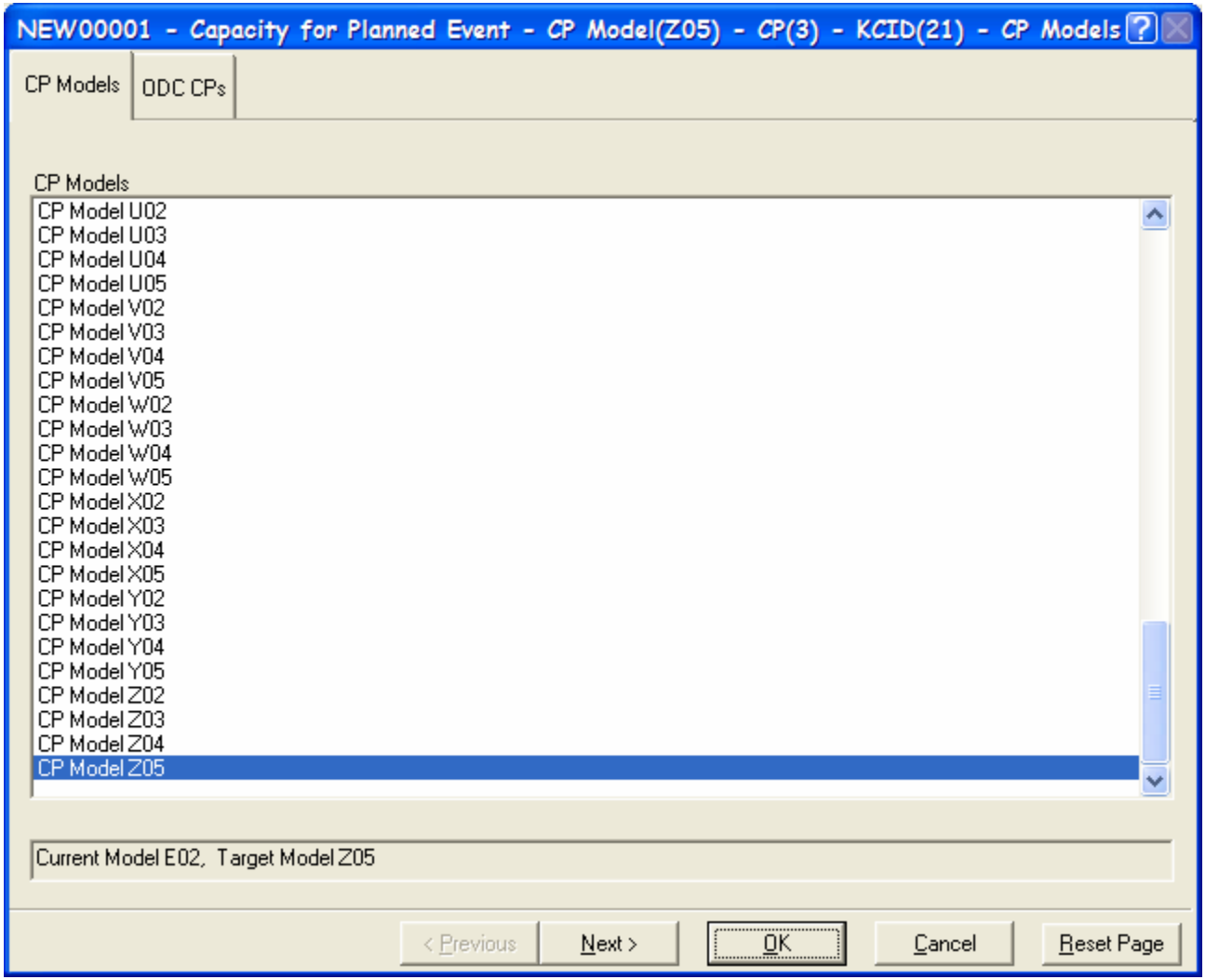
- Announcement October 20, 2009
  - 2097 GA3, November 20, 2009, but new CPE function available December 31, 2009
  - Driver 79
- Replacement Capacity
  - Replaces lost capacity within a customer's enterprise for planned down time events
    - Push/Pull planned outages
    - Planned Data Center moves and relocations
- CP ~~capacity details are~~ NOT ~~now managed by~~ feature codes
  - Any available and dormant resources may be configured and consumed
- Normal specialty engine rules are not managed/enforced
  - For example,
    - If you are a 703 then you can order CPE up to 3 zIIPs and 3 zAAPs.
    - If you want 5 zIIPs you need to order corresponding CP capacity in CPE record

Planned Event Example



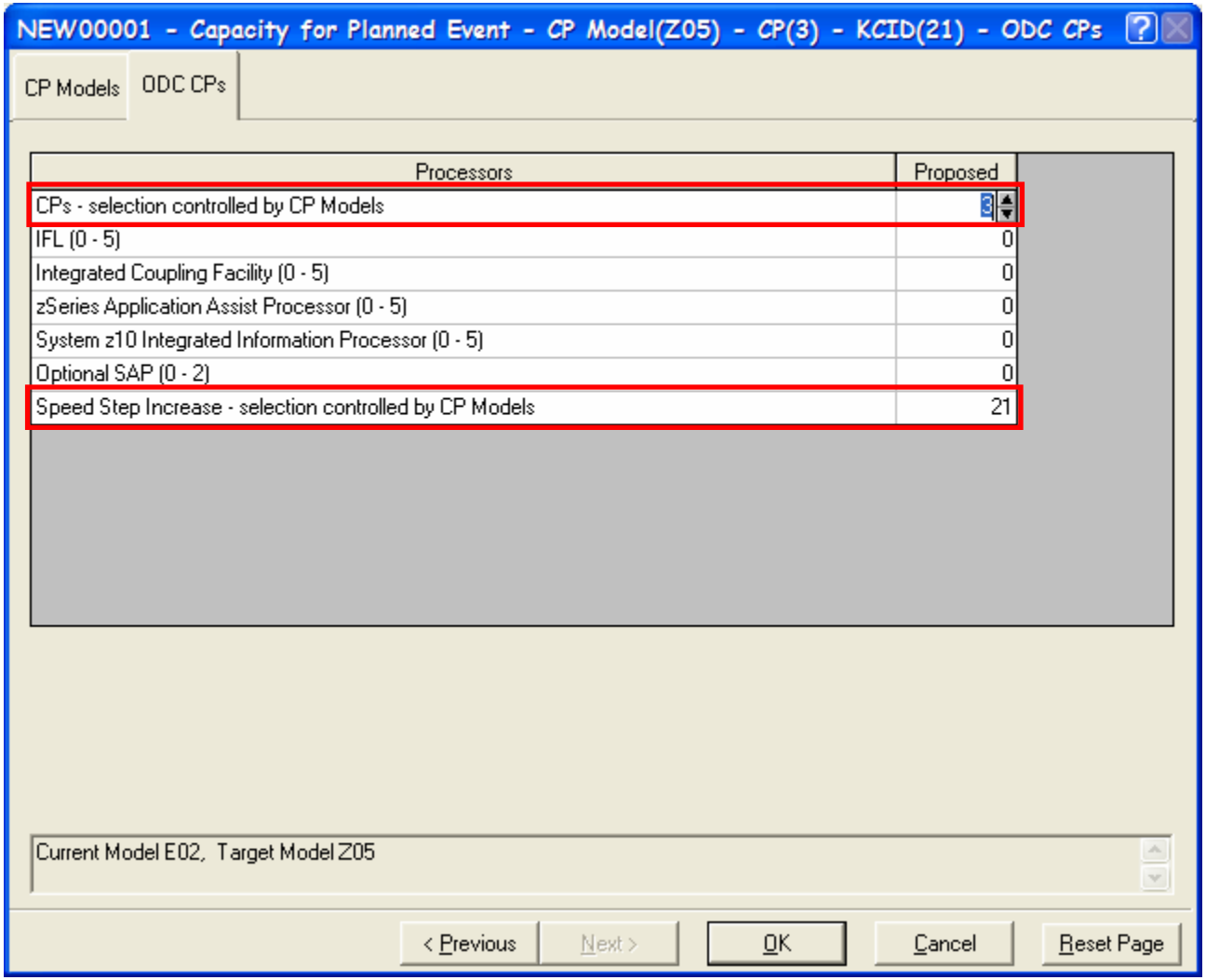
Planned Event Example

new!

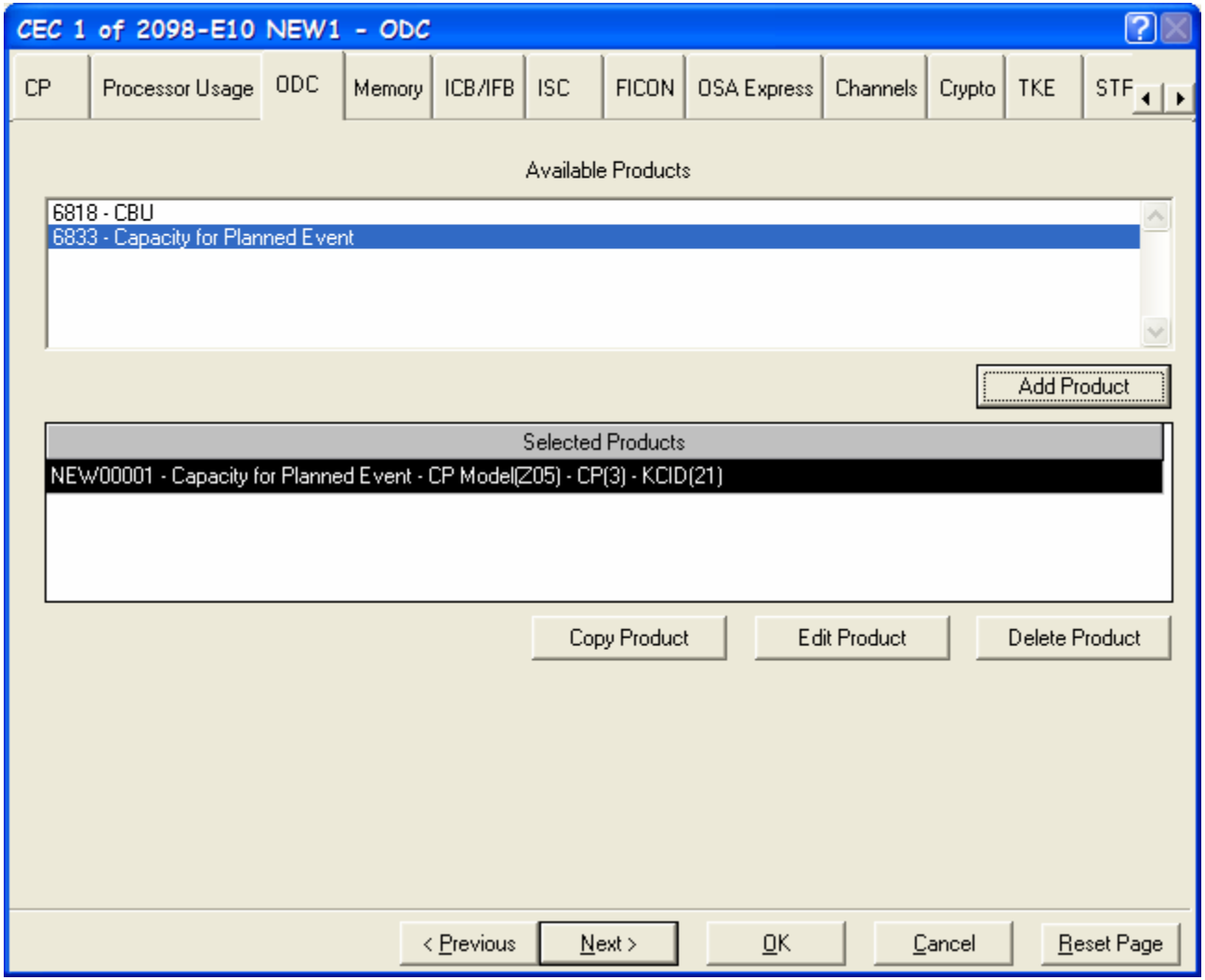


Planned Event Example

new!



Planned Event Example



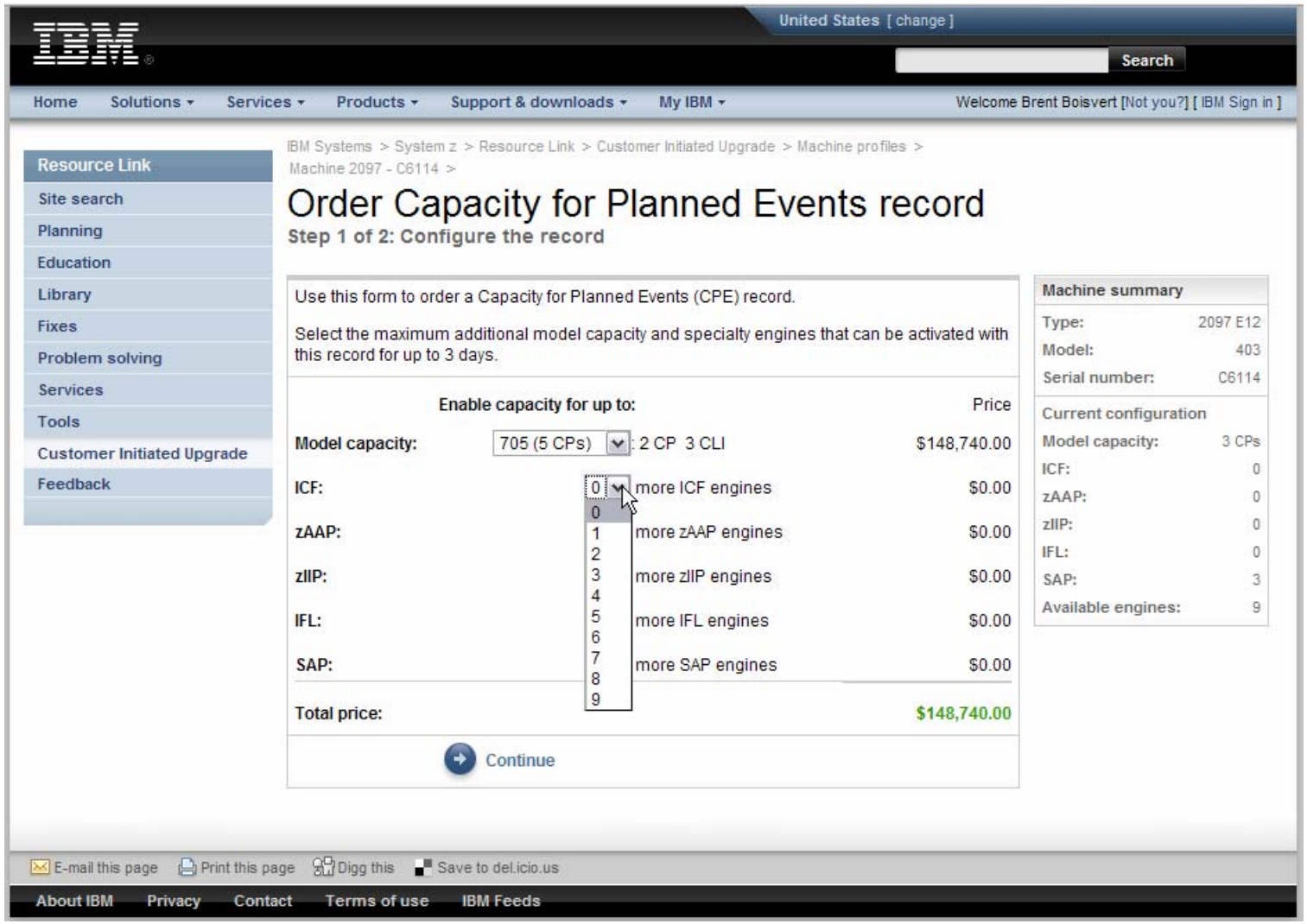
Capacity for Planned Event

```
On Demand Capacity Selections:
NEW00001 - Capacity for Planned Event –
CP Model(Z05) CP(3) - KCID(21)

On Demand Capacity Selections:
NEW00001 - Capacity for Planned Event
2098-E10  IBM System z10 Business Class    1
    5035  2-Way Processor E02              1
    6660  CP-E                             2
    6833  Capacity for Planned Event       1
    6865  E02 Capacity Marker              1
    9912  CPE authorization                1
```

Z01	Z02	Z03	Z04	Z05
Y01	Y02	Y03	Y04	Y05
X01	X02	X03	X04	X05
W01	W02	W03	W04	W05
V01	V02	V03	V04	V05
U01	U02	U03	U04	U05
T01	T02	T03	T04	T05
S01	S02	S03	S04	S05
R01	R02	R03	R04	R05
Q01	Q02	Q03	Q04	Q05
P01	P02	P03	P04	P05
O01	O02	O03	O04	O05
N01	N02	N03	N04	N05
M01	M02	M03	M04	M05
L01	L02	L03	L04	L05
K01	K02	K03	K04	K05
J01	J02	J03	J04	J05
I01	I02	I03	I04	I05
H01	H02	H03	H04	H05
G01	G02	G03	G04	G05
F01	F02	F03	F04	F05
E01	E02	E03	E04	E05
D01	D02	D03	D04	D05
C01	C02	C03	C04	C05
B01	B02	B03	B04	B05
A01	A02	A03	A04	A05
1-way	2-way	3-way	4-way	5-way

CPE Order Panel – ResourceLink



Needed:

On-line CoD buying

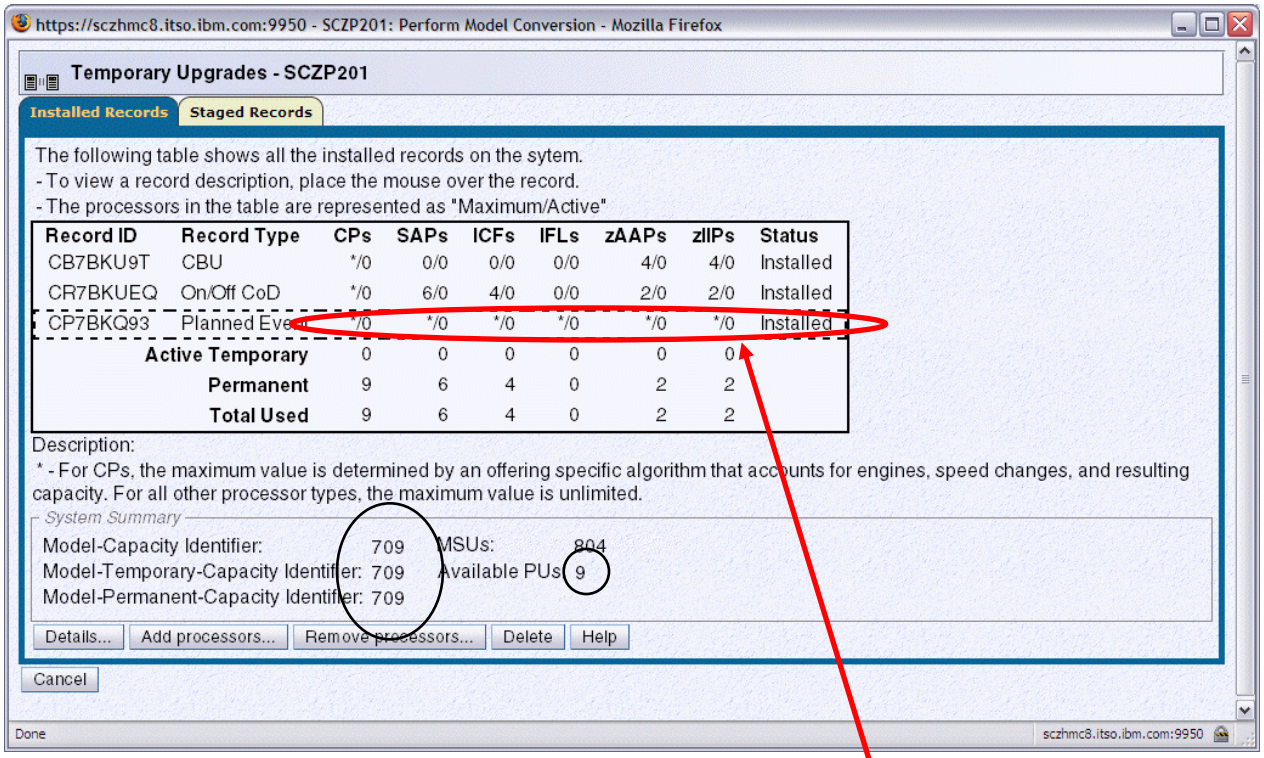
FC9900

CPE Authorization

FC9912

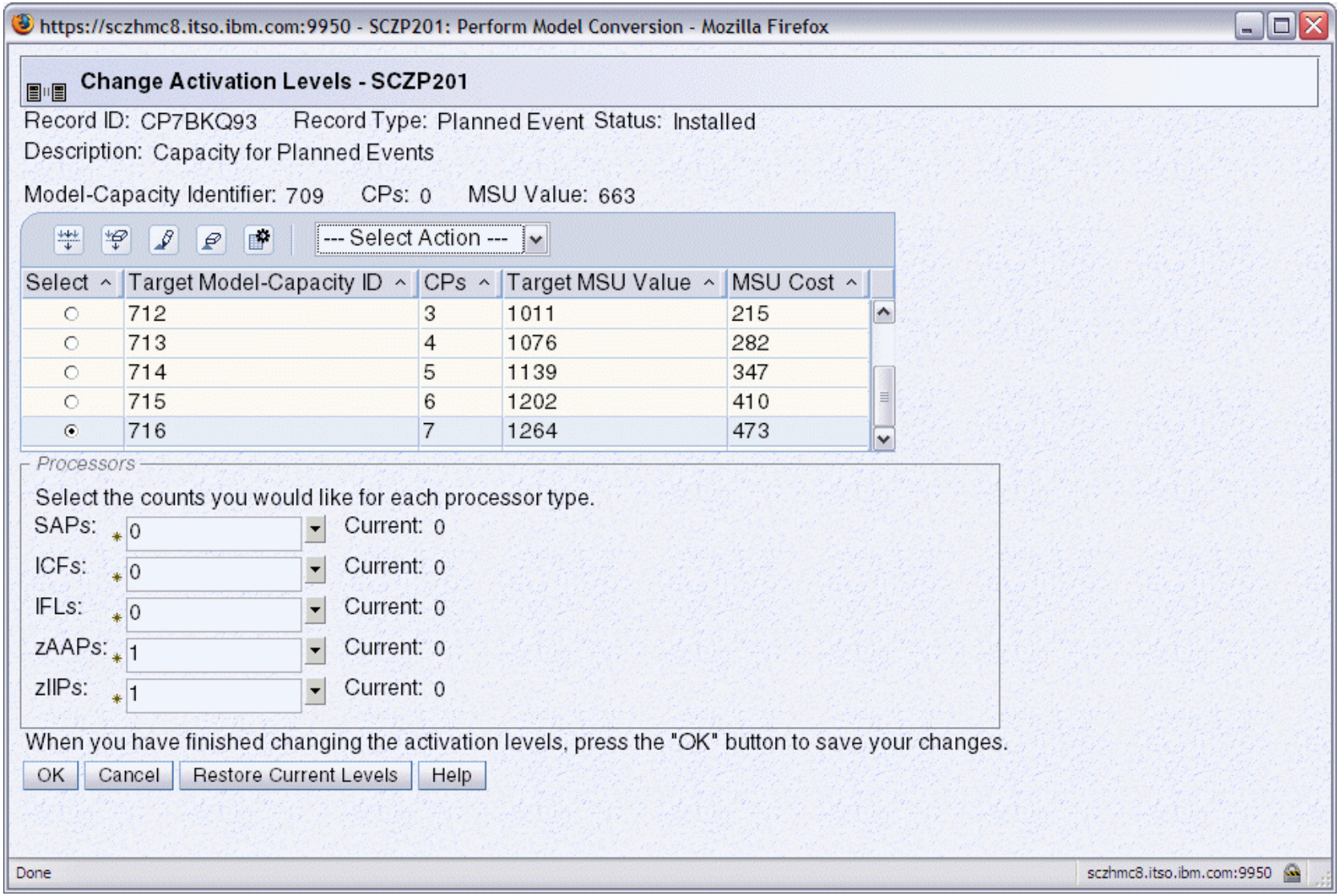
CPE example

- Model E26
- 26 PUs (on an E26)
- 9 active CPs
- 8 active specialty engines
- 9 dormant engines (available PUs)

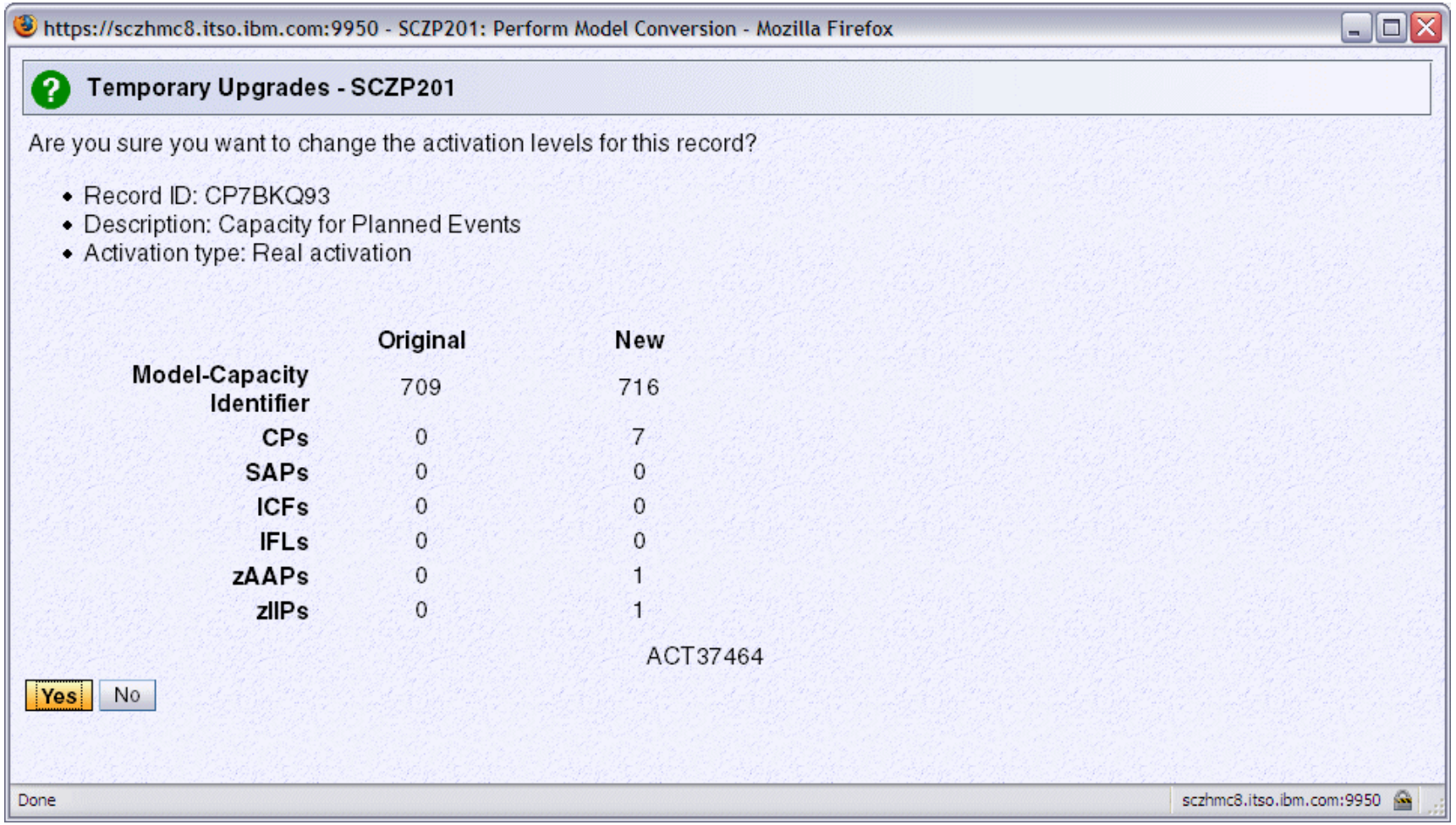


Fields will now be limited by new CPE record

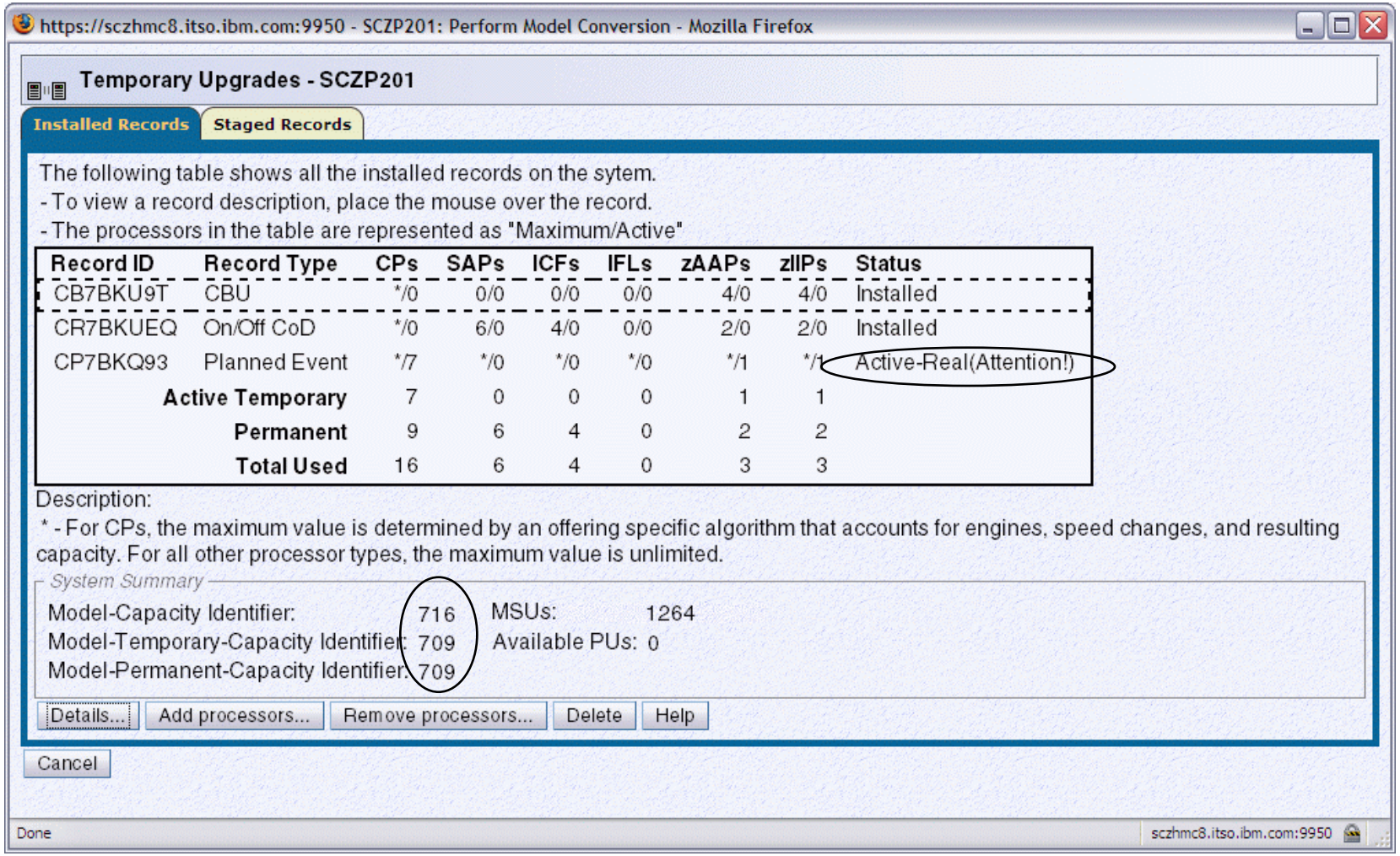
CPE Example – 709 to 716



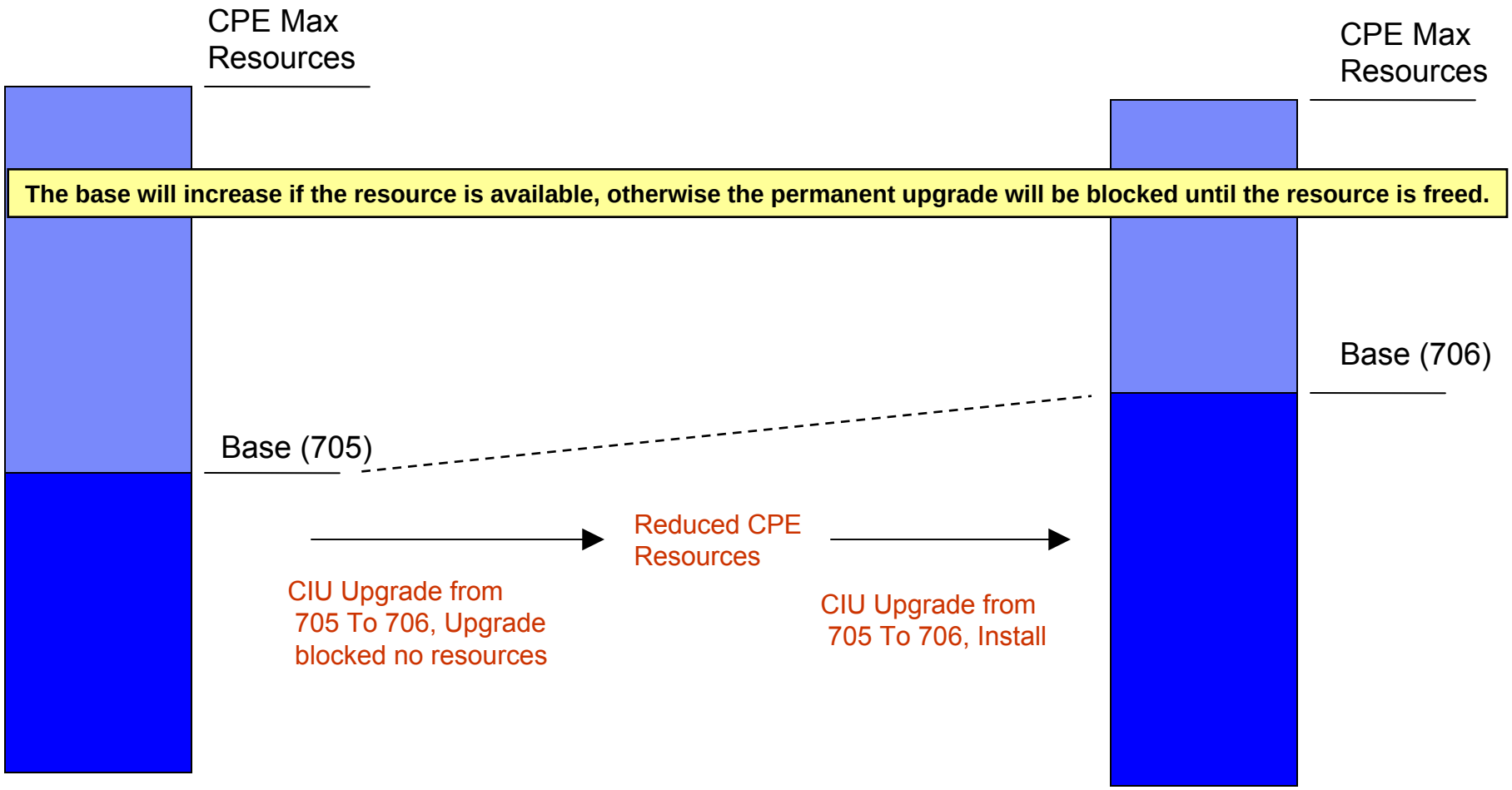
CPE Confirmation



CPE active



Permanent Upgrade with CPE Active



Agenda

- The Basics - Capacity on Demand
- Elements of the Offerings
- Capacity Backup
- Capacity for Planned Events
- On/Off Capacity on Demand
- Capacity Provisioning Manager

On/Off Capacity on Demand

Resources

CP Capacity
% increase in capacity
Specialty engines:
zIIP, zAAP, ICF, IFL, SAP

Time elements

Test duration = NA
Real activation = Unlimited
1 hr grace period
Expiration date set to 180 days

Tokens

Number of Tests = 0
Number of Real activations = Unlimited
Tokens - MSU days and processor days (for specialty engines)

Order process limits

- Temporary CP capacity up to 100% of purchased capacity
- Number of temporary zIIPs or zAAPs can not exceed total number of permanent + temporary CPs
- Number of temporary IFLs up to the total of purchased IFLs
- Number of temporary ICFs plus permanent ICFs not to exceed 16

Machine limits

- Can not decrement capacity level
- Can not remove permanent engines from configuration
- Positive increase in capacity (processor speed) with temporary activations

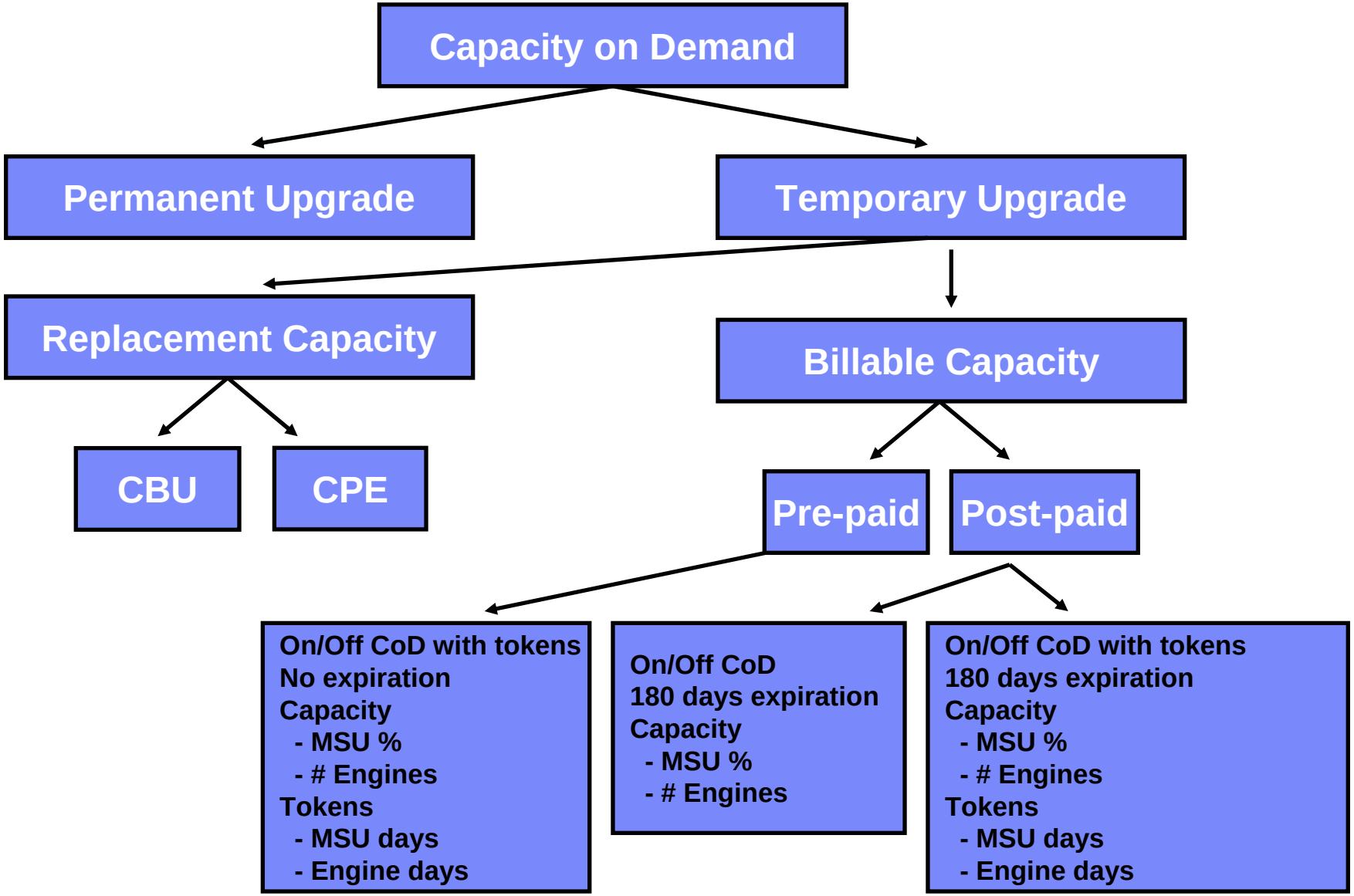
Contract terms and conditions

- H/W and S/W charges
- No administrative tests (except on z196, z114 and z9)
- One 24 hour test record

On/Off CoD Replenishment

Component	Replenish
Resources (CP, specialty engines)	Yes
On/Off CoD Test	No Yes, if z196, z114 or z9
Pre-Paid Tokens	Yes Pre-paid On/Off CoD records do not expire.
Post Paid Tokens	Yes Post Paid On/Off CoD records can expire, even when with Tokens.
Expiration date -	Yes Automatic replenishment if z196 or z114

Basics of CoD



New On/Off Capacity on Demand – Tokens

- Self-imposed limits
  - Specialty Engines or CP MSU's
    - IFL day or ICF day or zIIP day or zAAP day
    - "Engine day" - Use specialty engine for 24 hours per token
      - Example: Purchase 5 IFL day engines for 20 days (5x20=100 tokens)
      - 1 token "per peak activated engine(s)" is decremented during a 24 hour period
        - > Activate 2 IFL's for 5 days (2x5=10 tokens used)
        - > Thus, 100-10=90 tokens remaining
        - > Auto deactivation after all tokens have expired
  - No scheduled expiration date for pre-paid tokens
    - Post-paid On/Off CoD expiration dates remain, but tokens can also be used with post paid On/Off CoD
    - Tokens decrement as used
    - Token pools can be replenished to increase a specialty engine-day pool or
      - an MSU-day pool
    - Auto deactivation after any active record's token pool (IFL days, CP MSU days, etc) is empty
      - After auto deactivate, you may re-activate those resources that still have tokens left (remaining zIIP tokens for example)
- Ordered by the customer via ResourceLink Wizard
  - Not ordered via IBM Configurator

Capacity tokens for specialty engines

- **Unassigned IFLs**
  - IFL tokens are only consumed for IFL activation levels above the unassigned IFL count
  - Example:
    - Machine has 2 Unassigned IFLs
    - IFL tokens are not consumed if <= 2 IFLs are activated – eg activating 1 IFL
      - Consumes no IFL Day tokens per 24 hour period
    - Tokens are only consumed from 3rd IFL on – eg activating 3 IFLs
      - Consumes one IFL Day token per 24 hour period

CP MSU Day – Tokens

- **Pre-Paid with self-imposed limits - CP MSU day**

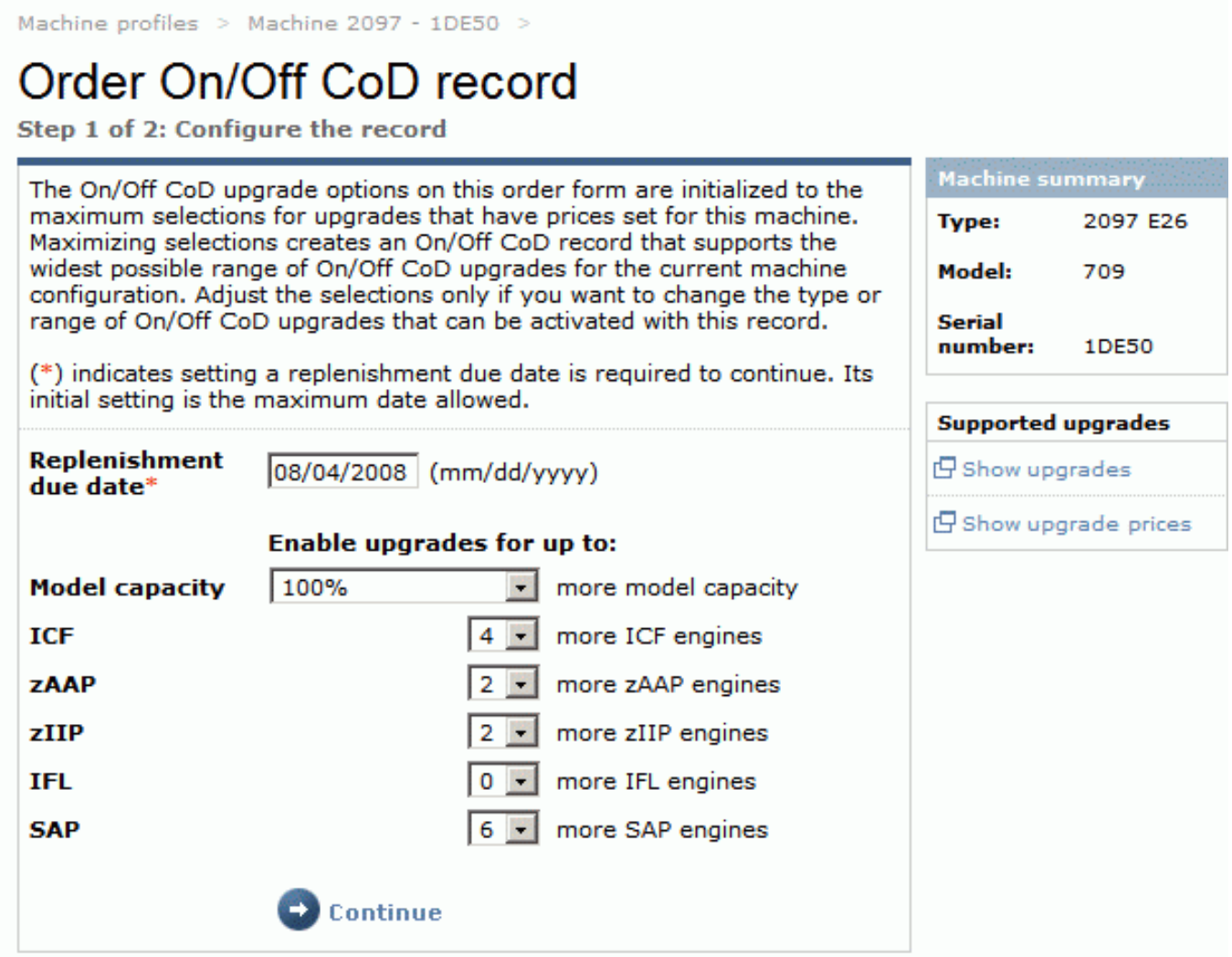
CI (MSU)	Y01 (76)	Z01 (83)	Y02 (142)	Z02 (155) HWM	X03 (177)	Y03 (202)	Z03 (221)	Y03 (258)	Y04 (258)	Z04 (283)	2x HWM (310)
	←----------207 MSUs ----------→										
	←----------128 MSUs ----------→										
	←----------126 MSU's ----------→										
	←----------47 MSUs ----------→										
N-way	1	1	2	2	3	3	3	3	4	4	5

- "MSU day" - Use peak MSU value for a 24 hour period per token
  - Example: Customer purchases **200 additional MSU's for 60 days** (200 x 60 = 12,000 MSU tokens)
    - x tokens are decremented where x is the CP MSU days deltas between maximum purchased capacity (including high water mark) and the active On/Off Capacity on Demand record
    - **Activate Y03 (47 additional MSU's (202-155=47)) for 5 days (47 x 5 = 235 used MSU tokens)**
    - 12,000 – 235 = 11,765 remaining tokens

- Rules
  - No reduction of capacity or the number of CPs permitted (even if capacity increased)
  - **Cannot exceed 2 times the purchased capacity (155 x 2 = 310 in this example)**
    - same is true for specialty engines
  - On/Off CoD below the high water mark will not consume tokens

CI = Capacity Indicator
HWM = High Water Mark

On/Off CoD on-line order



Needed:

On-line CoD buying

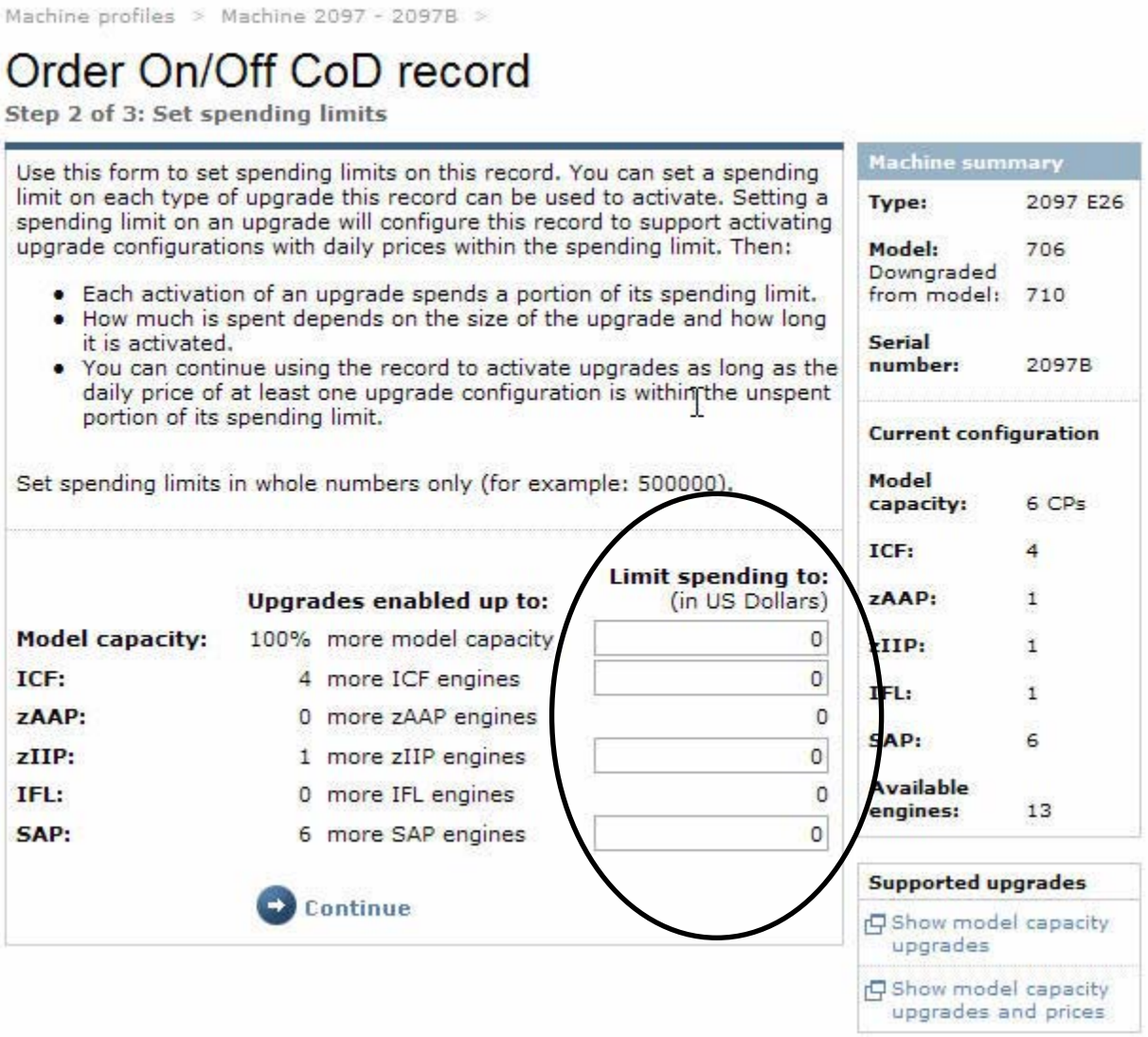
FC9900

OOCoD Authorization

FC9896

Contract signature

Post Paid On/Off CoD on-line order with Tokens



Pre-Paid Tokens within an On/Off CoD order

Machine profiles > Machine 2097 - C39EE >

Order On/Off CoD record

Step 2 of 3: Add prepaid upgrades

Use this form to add prepaid upgrades to your On/Off CoD record order. Repeat these steps for each prepaid upgrade you want to order:

1. Select an upgrade.
2. Enter the number of days you want to use the selected upgrade.
3. Click the "Add to order" link for the selected upgrade.

Upgrade configuration		Price per day	Days of use	
Model capacity	606 (6 CPs)	0		→ Add to order
ICF	0	0		
zAAP	2	0		→ Add to order
zIIP	1	0		→ Add to order
IFL	3	0		→ Add to order
SAP	6	0		→ Add to order

Prepaid upgrades

Upgrade configuration	Days of use	Tokens	Price
–	–	–	$0.00
Total price			**$0.00**

Order number LC7EEGNL

About this order

Status: · Ordered 7 May 2008 · Staging order

Description: +100% model capacity, +0 ICF, +2 zAAP, +1 zIIP, +3 IFL, +6 SAP, to 11/03/2008

Replenishment due date: 11/03/2008

	Upgrades enabled for up to	Upgrade daily prices
Model capacity:	100% more model capacity	[Show upgrade prices]
ICF:	0 more ICF engines	
zAAP:	2 more zAAP engines	$1,388.89 per engine
zIIP:	1 more zIIP engines	$1,111.11 per engine
IFL:	3 more IFL engines	$1,666.67 per engine
SAP:	6 more SAP engines	$2,777.78 per engine

This order is **maximized** for the current machine configuration.

Prepaid upgrades

Upgrade configuration	Days of use	Tokens	Price
608 (8 CPs)	10	1130	$0.00
607 (7 CPs)	5	285	$0.00
706 (6 CPs)	3	519	$0.00
4 IFLs	5	5	$0.00
5 IFLs	2	4	$0.00
Total price			**$0.00**

Cancel order

On/Off CoD authorization space

base capacity 402

HWM 402 (51 MSU)

=> authorization area up to 102 MSU (2 x 51)

7xx													
6xx													
5xx		502 (110)											
4xx		402 (51)	403 (75)	404 (97)	405 (118)								
N-way	1	2	3	4	5	6	7	8	9	10	11	12	13	14

On/Off CoD authorization space

Permanent capacity 402

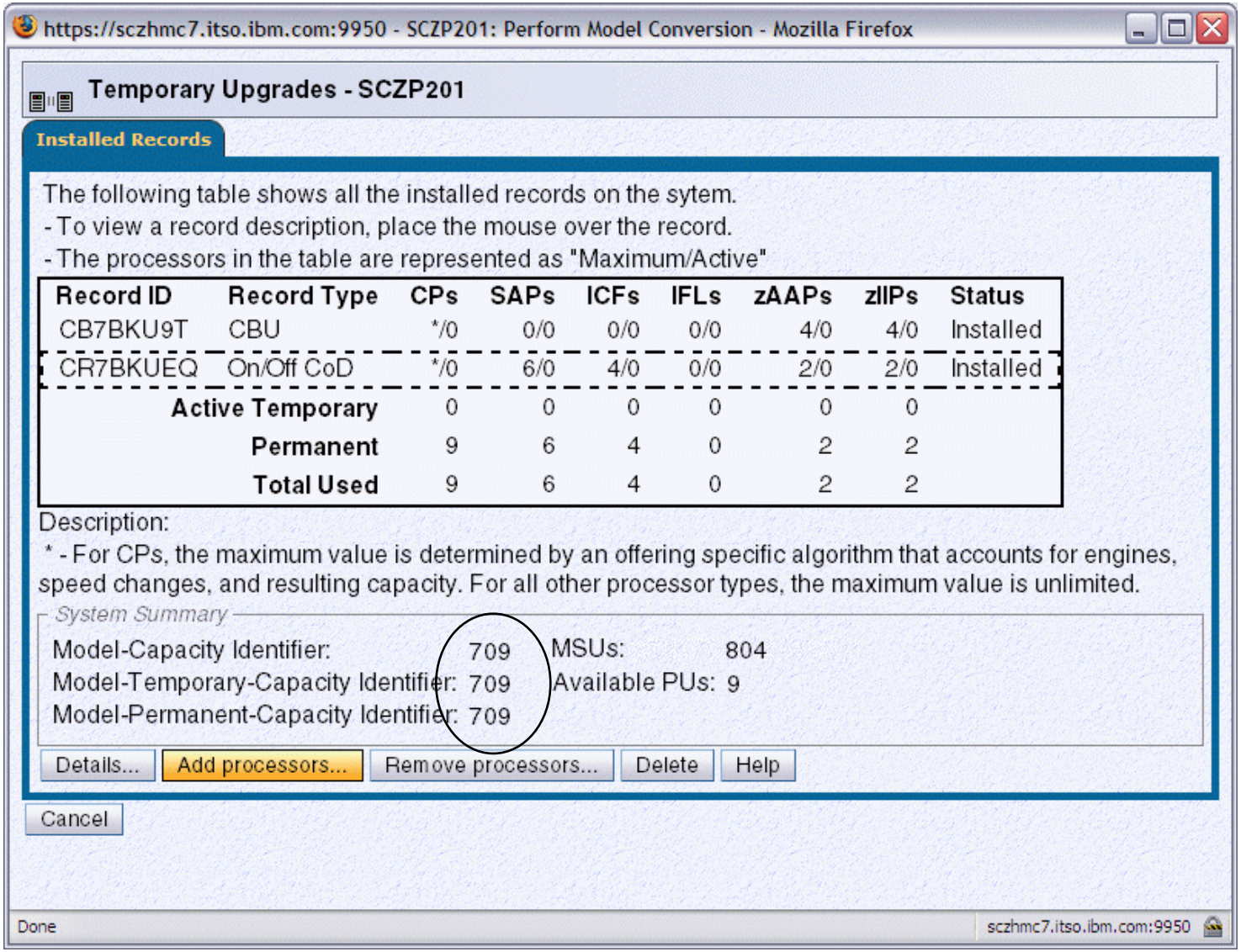
purchased capacity high water mark (HWM) 504 (207 MSU)

=> authorization area up to 414 MSU (2 x 207)

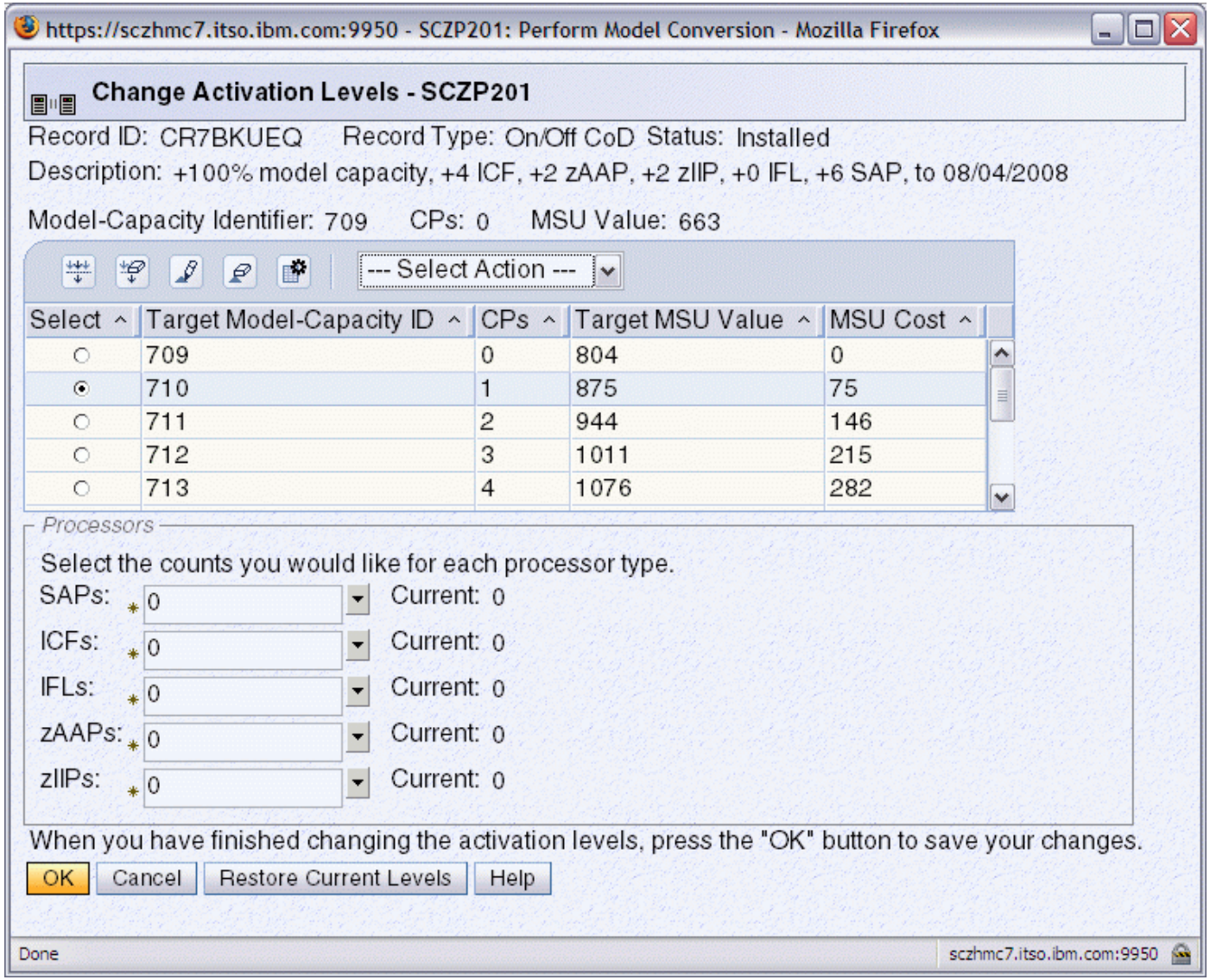
7xx		702 (215)	703 (312)	704 (401)	705 (488)								
6xx		602 (149)	603 (215)	604 (277)	605 (339)	606 (398)	607 (455)						
5xx		502 (110)	503 (160)	504 (207)	505 (252)	506 (296)	507 (340)	508 (382)	509 (422)				
4xx		402 (51)	403 (75)	404 (97)	405 (118)	406 (139)	407 (160)	408 (180)	409 (199)	410 (218)	411 (237)	412 (255)	
N-way	1	2	3	4	5	6	7	8	9	10	11	12	13	14

Zero Hardware cost

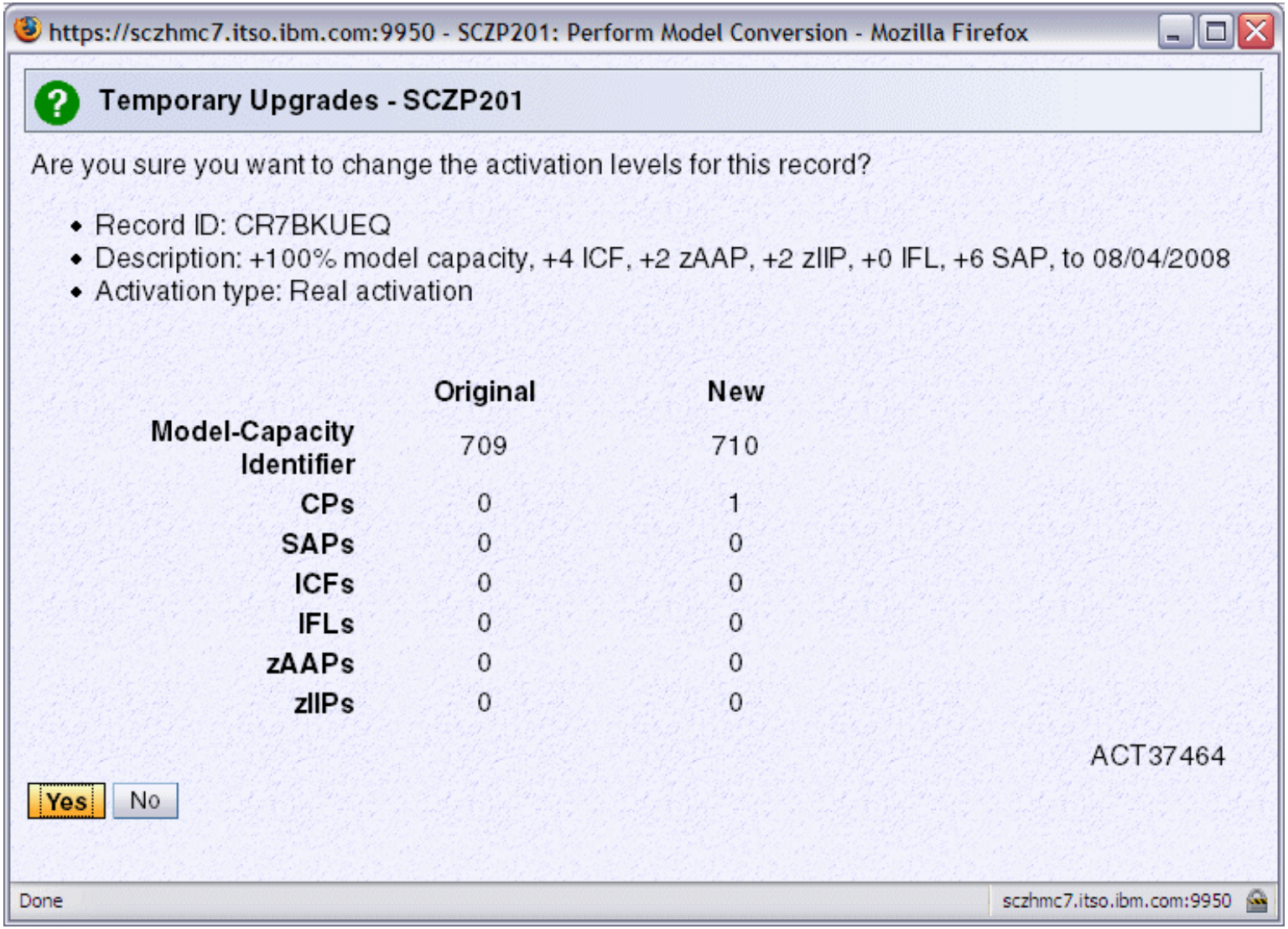
On/Off CoD - Example



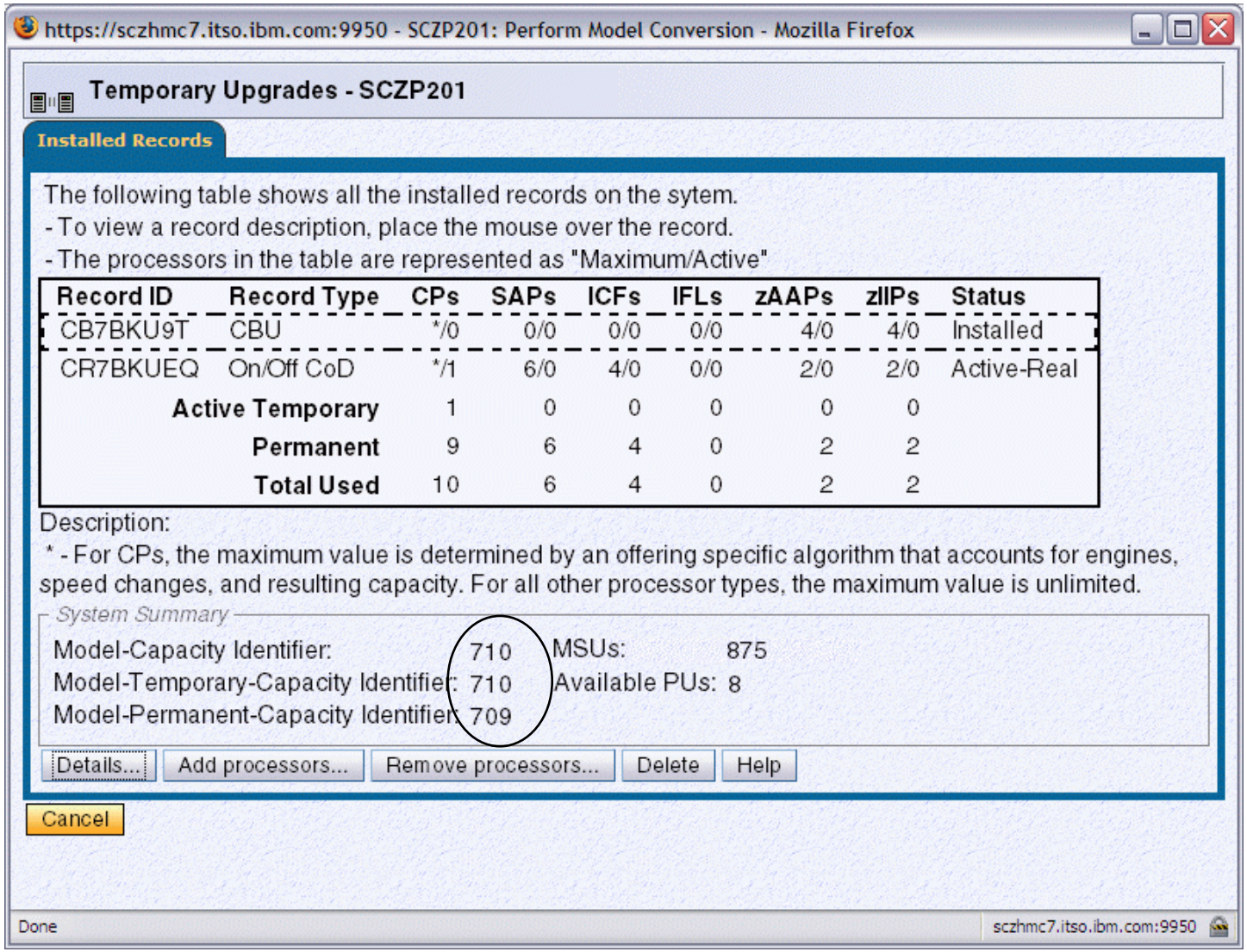
On/Off CoD – 709 to 710



On/Off CoD - Confirmation

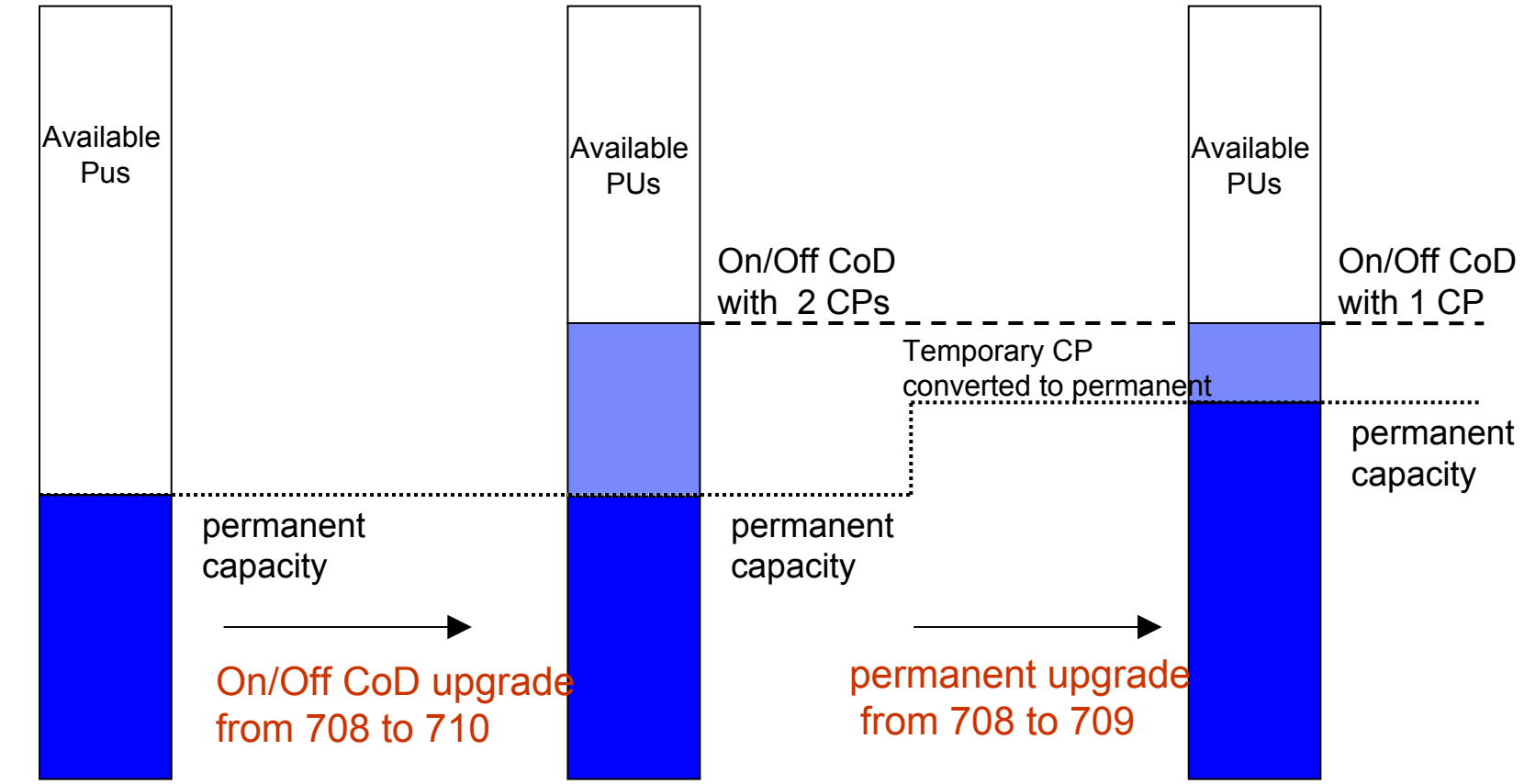


On/Off CoD - Result



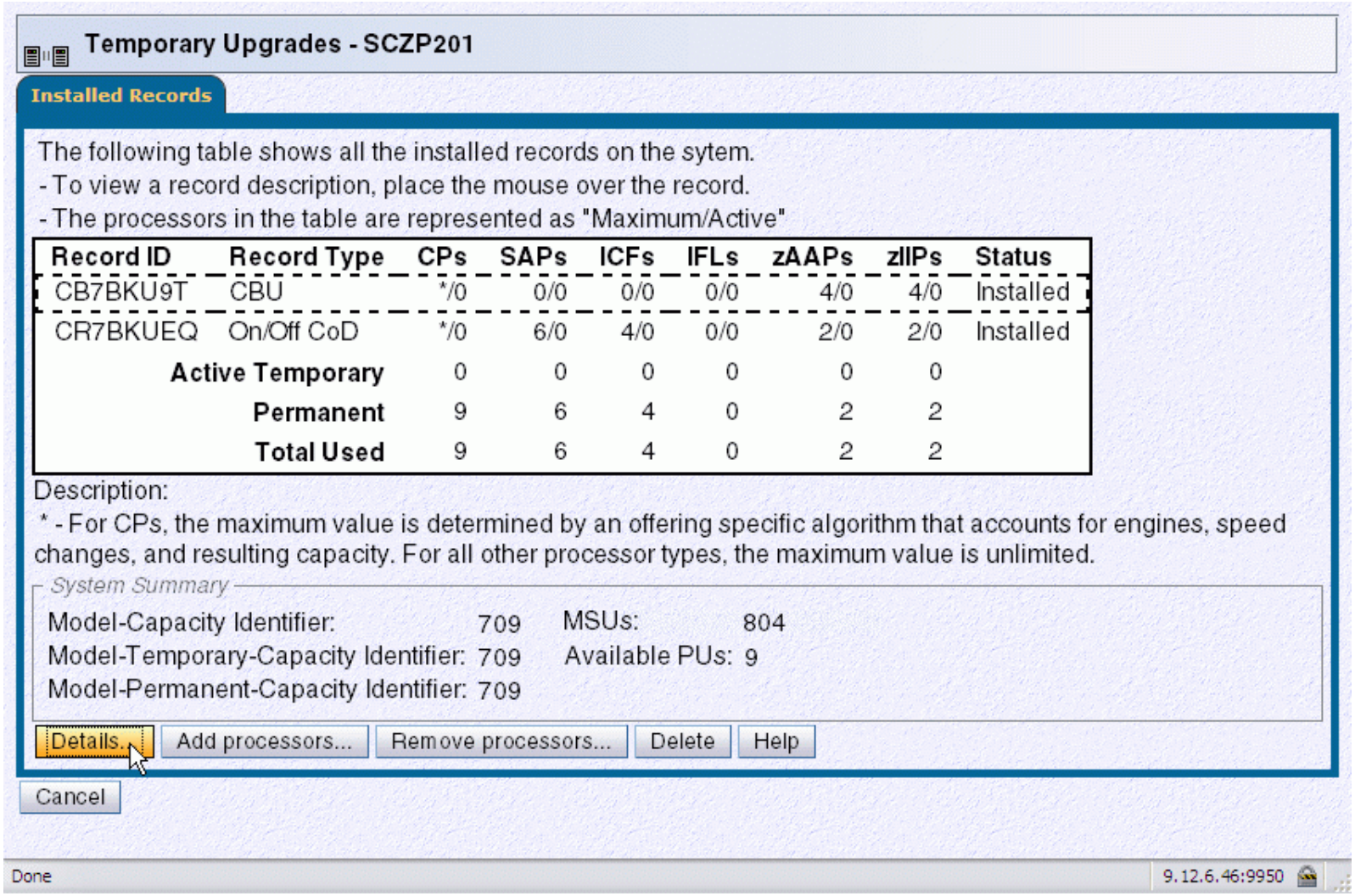
Permanent Upgrade with On/Off CoD Active

The On/Off CoD processors of the same type are converted to permanent.

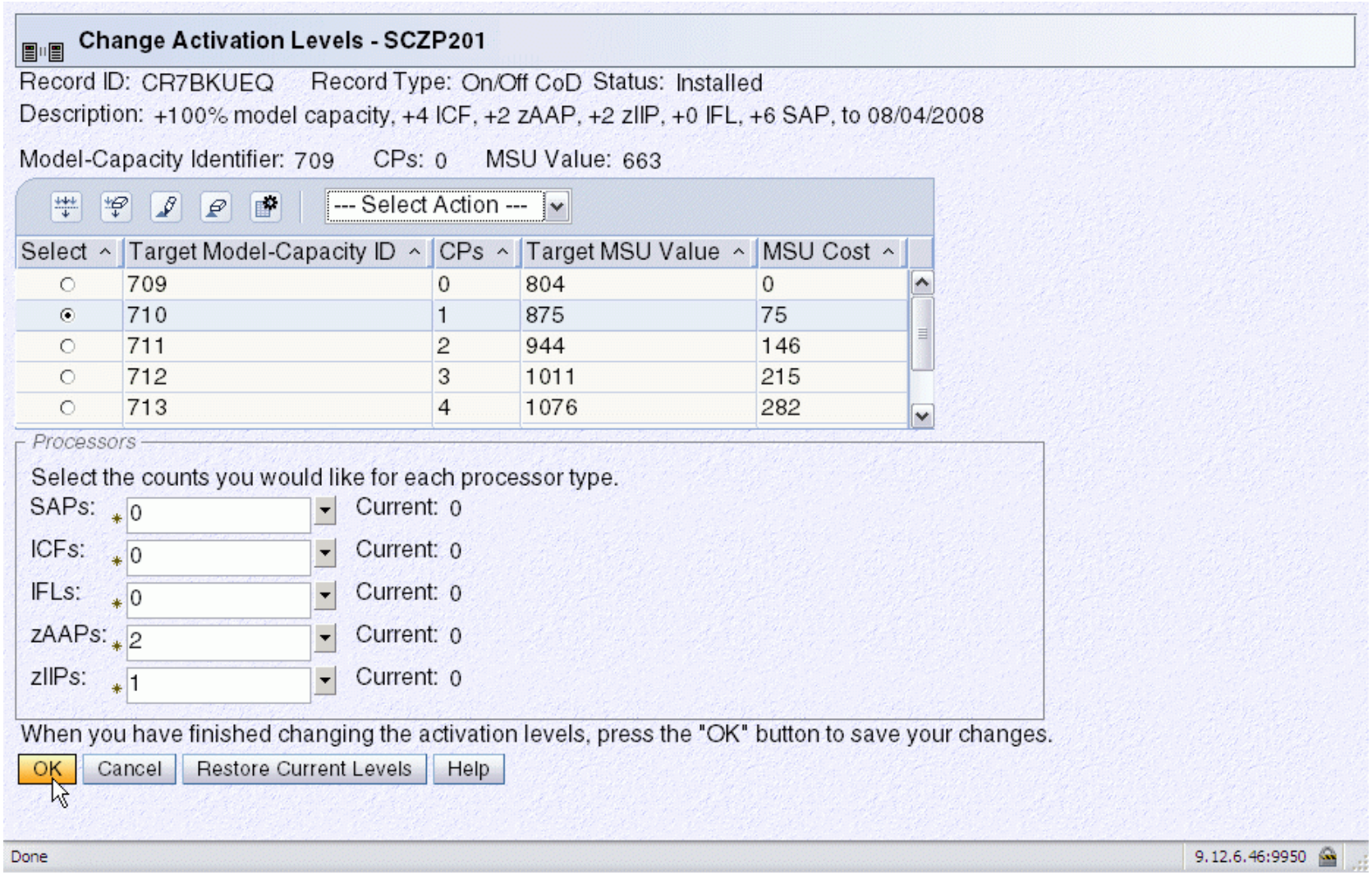


Conversion will NOT occur if there are "pending" CBU resources.

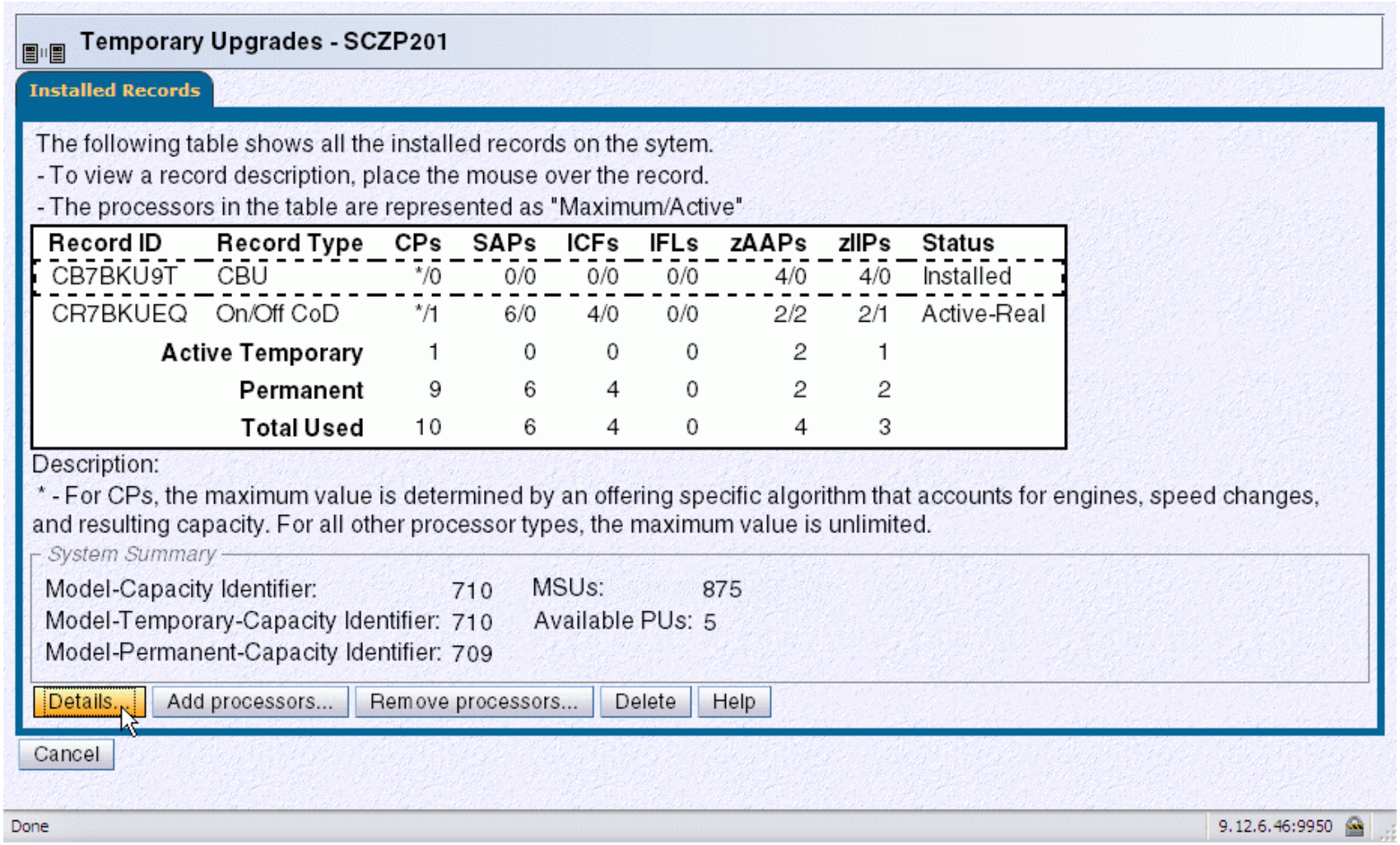
Multiple active temporary records - example



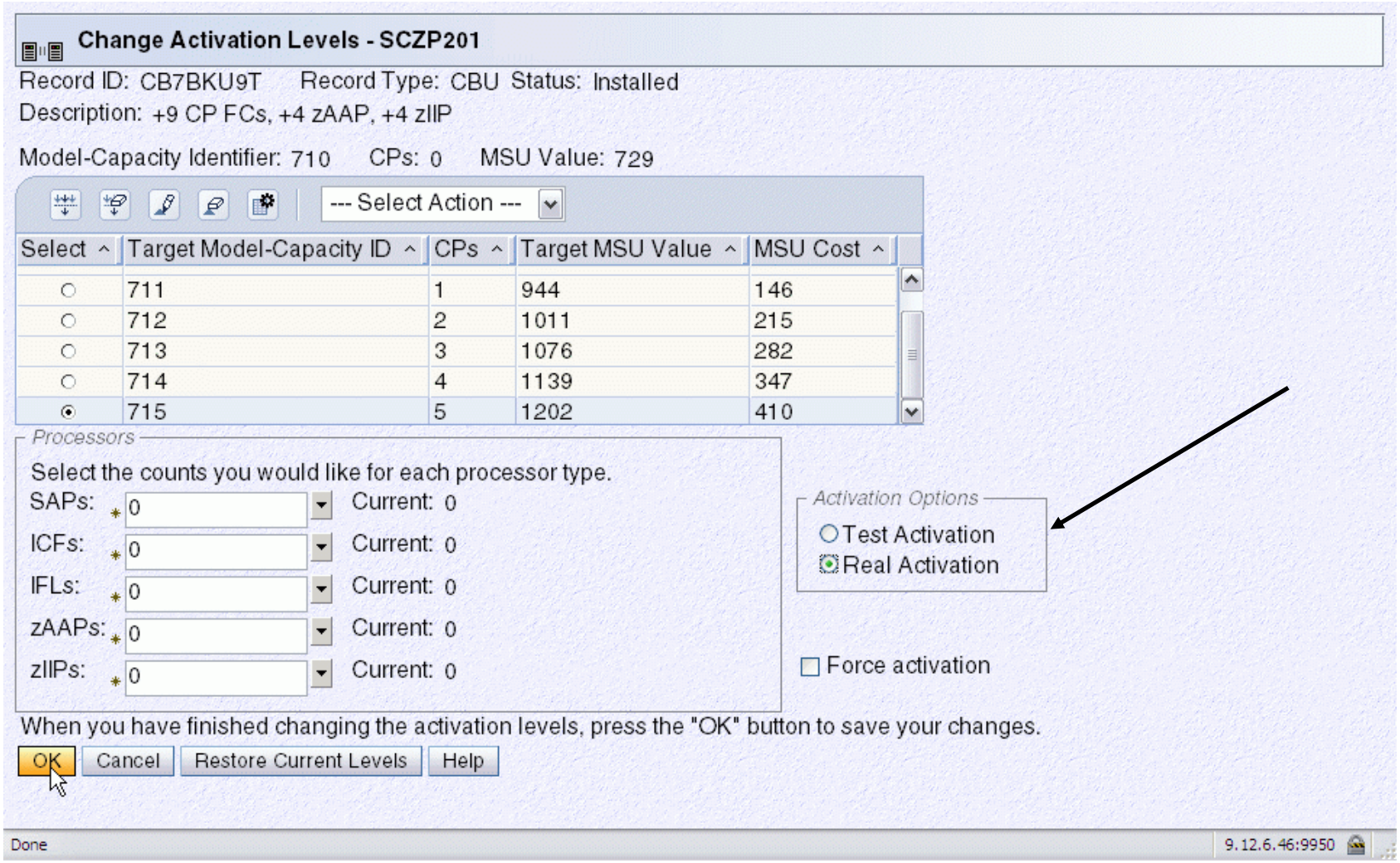
Multiple active temporary records - example



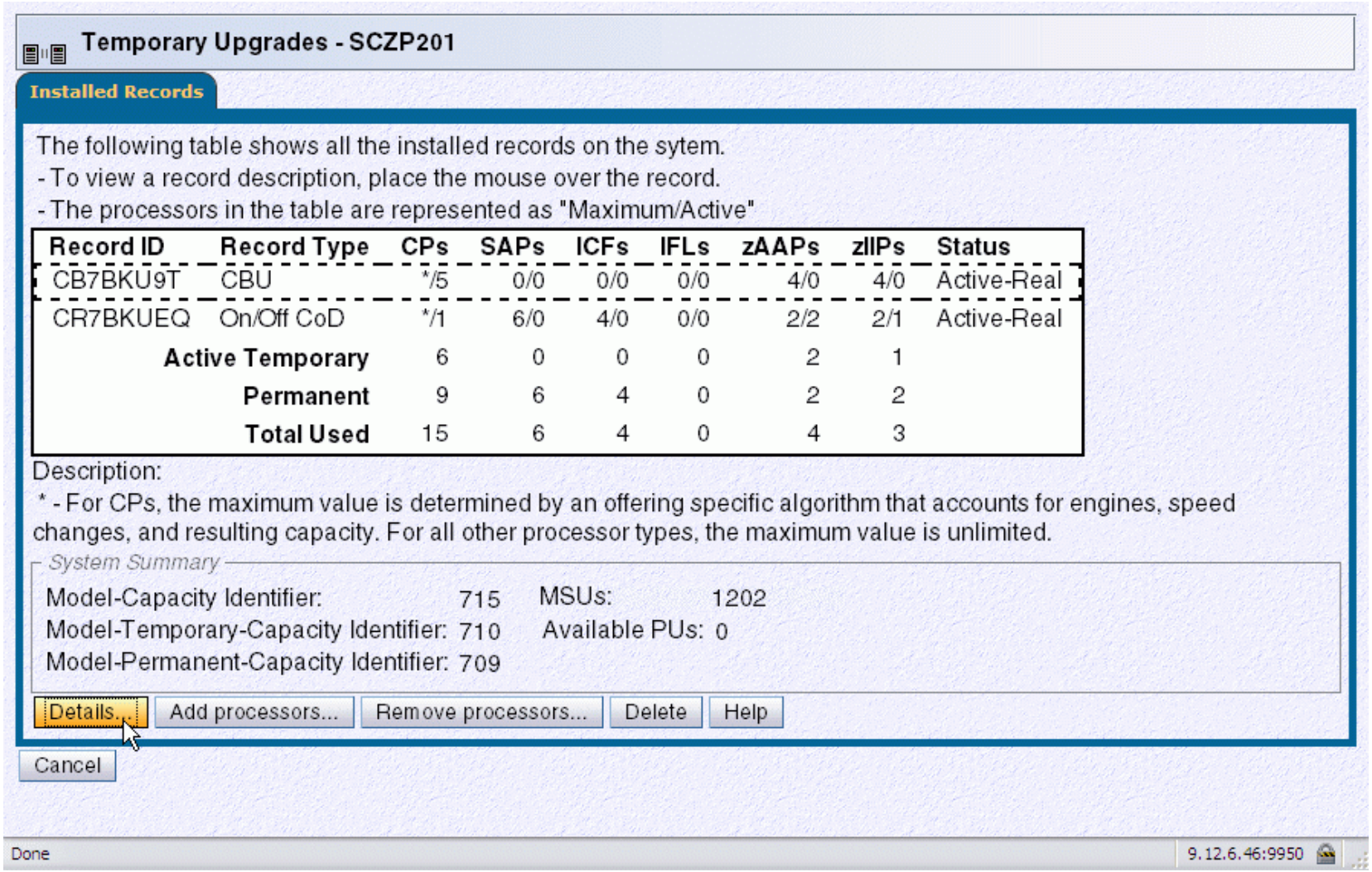
Multiple active temporary records - example



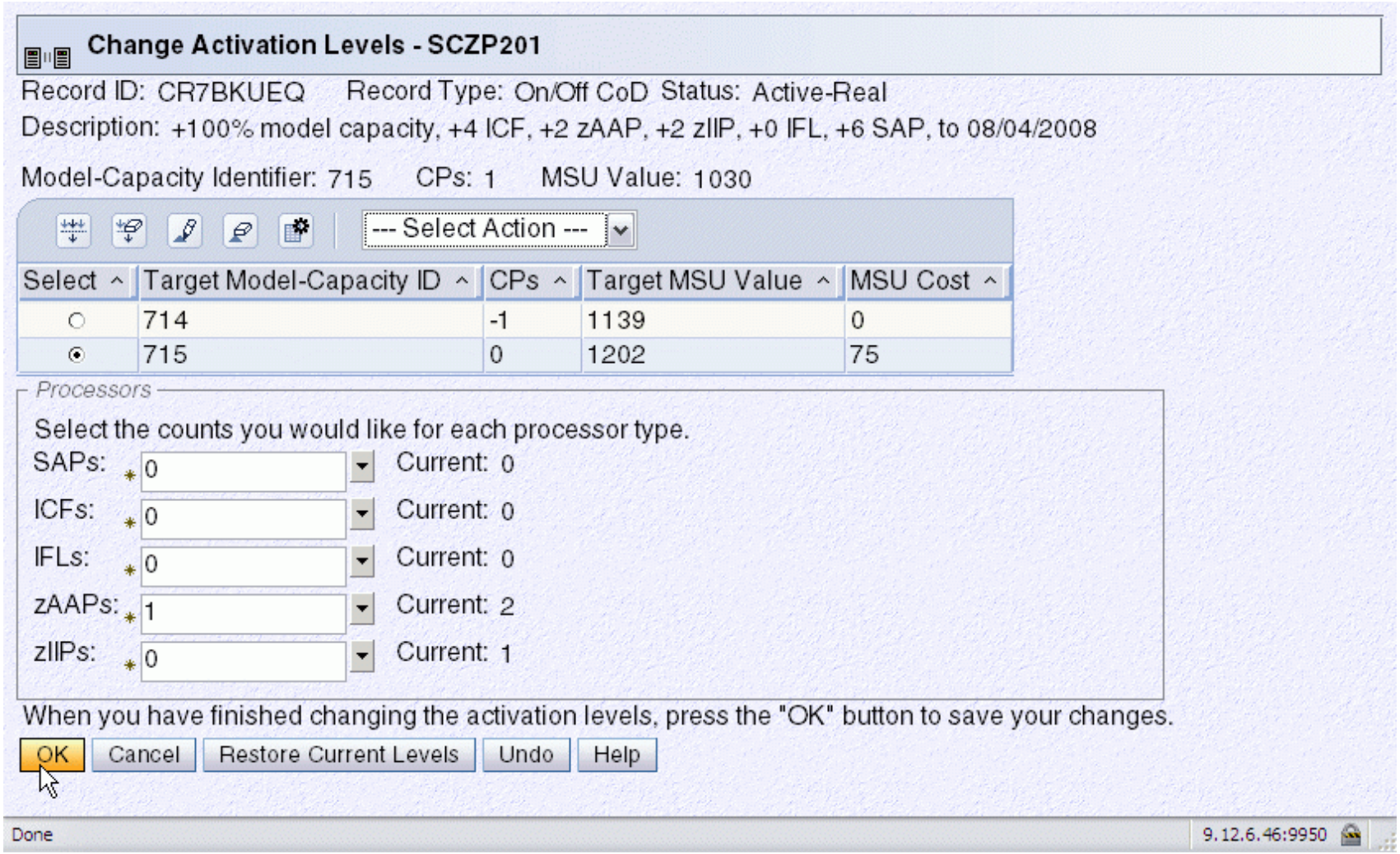
Multiple active temporary records - example



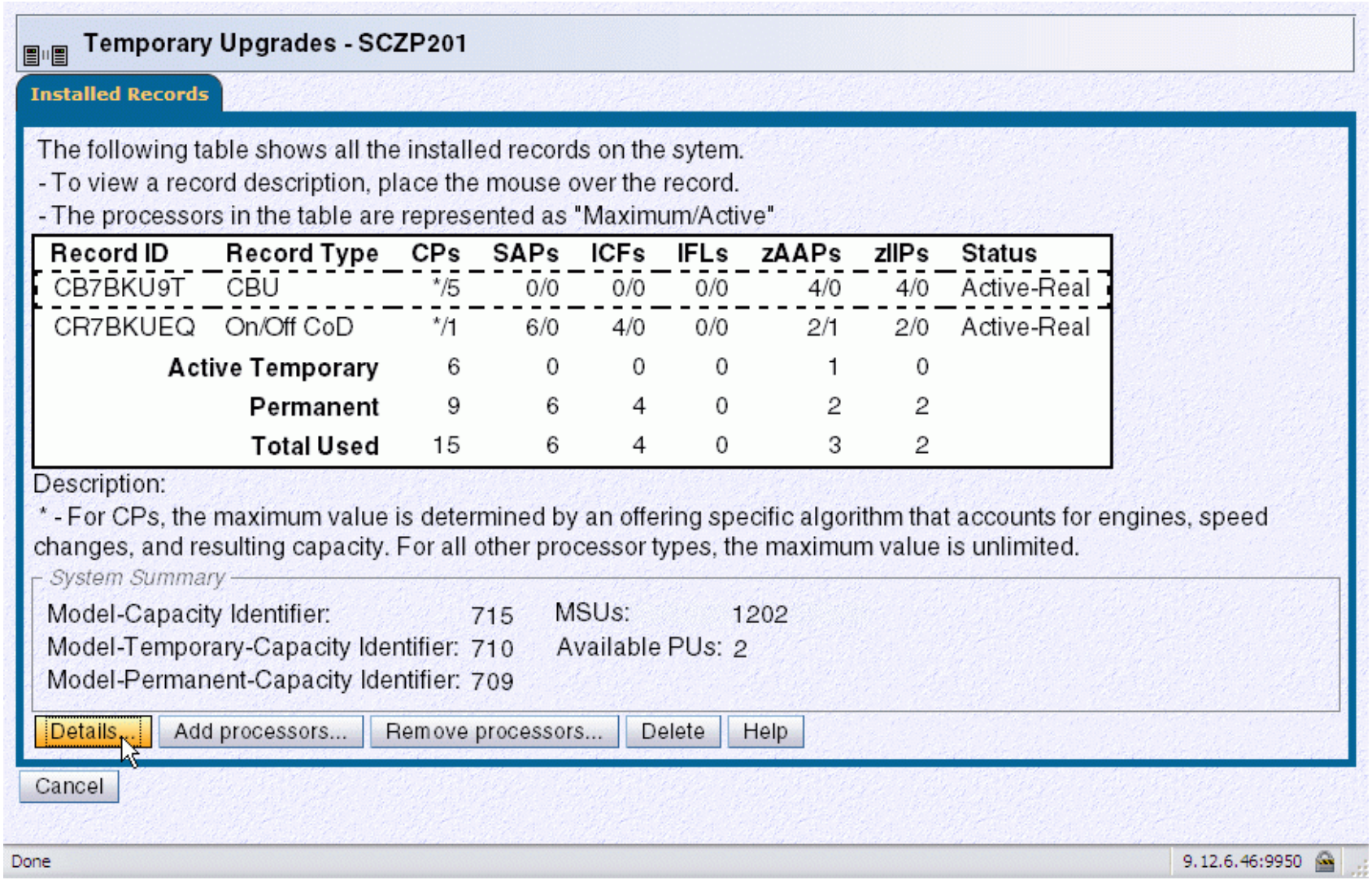
Multiple active temporary records - example



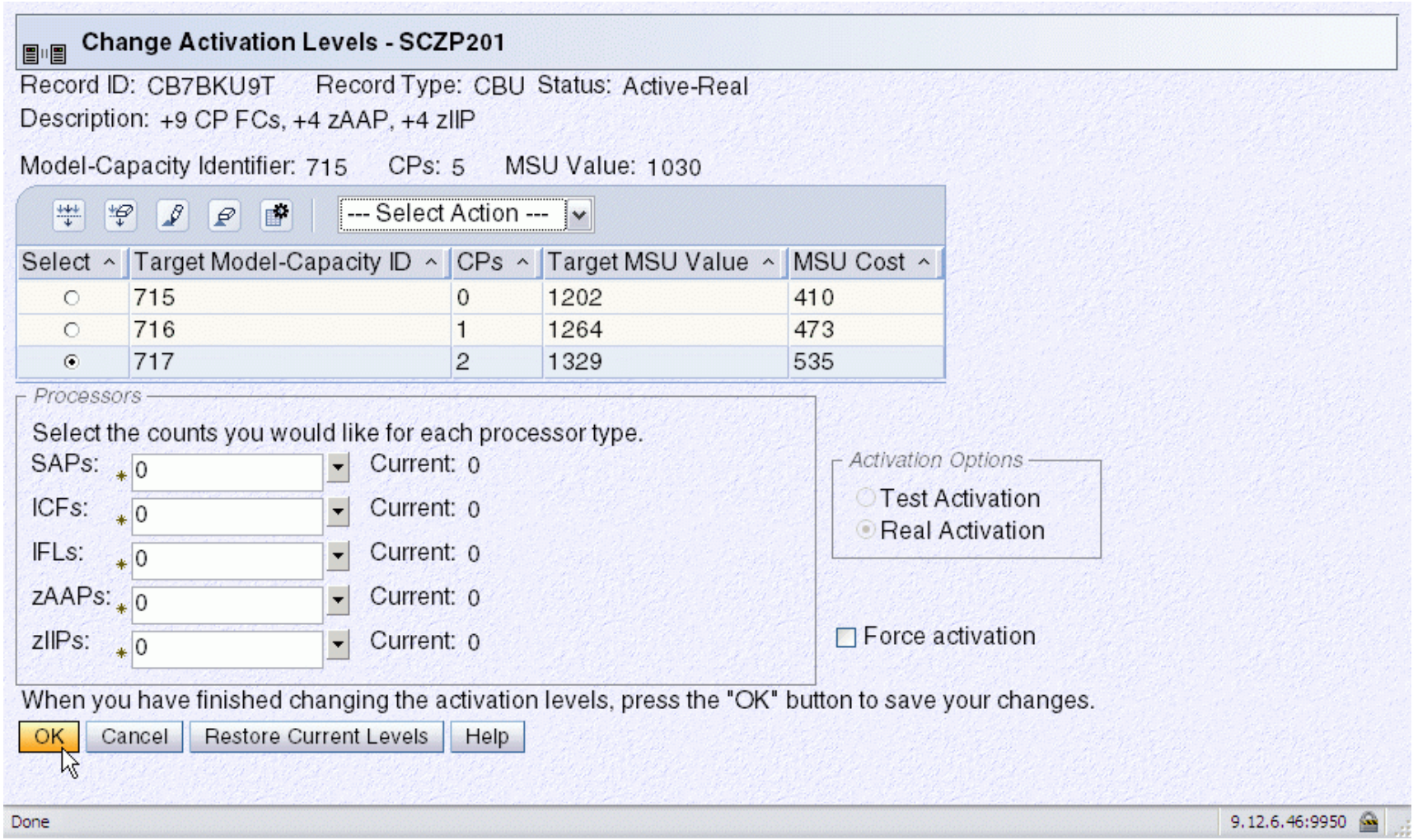
Multiple active temporary records - example



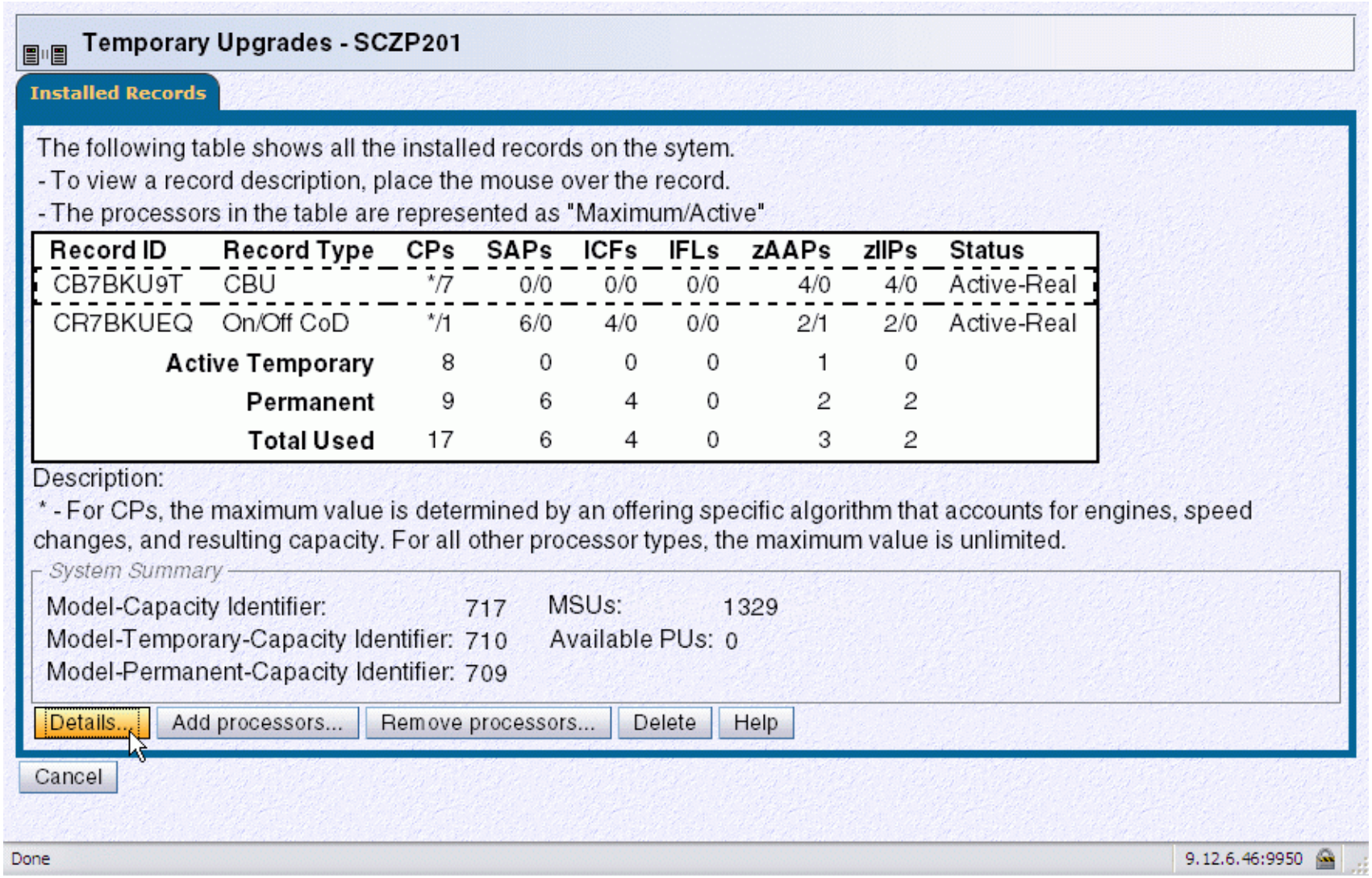
Multiple active temporary records - example



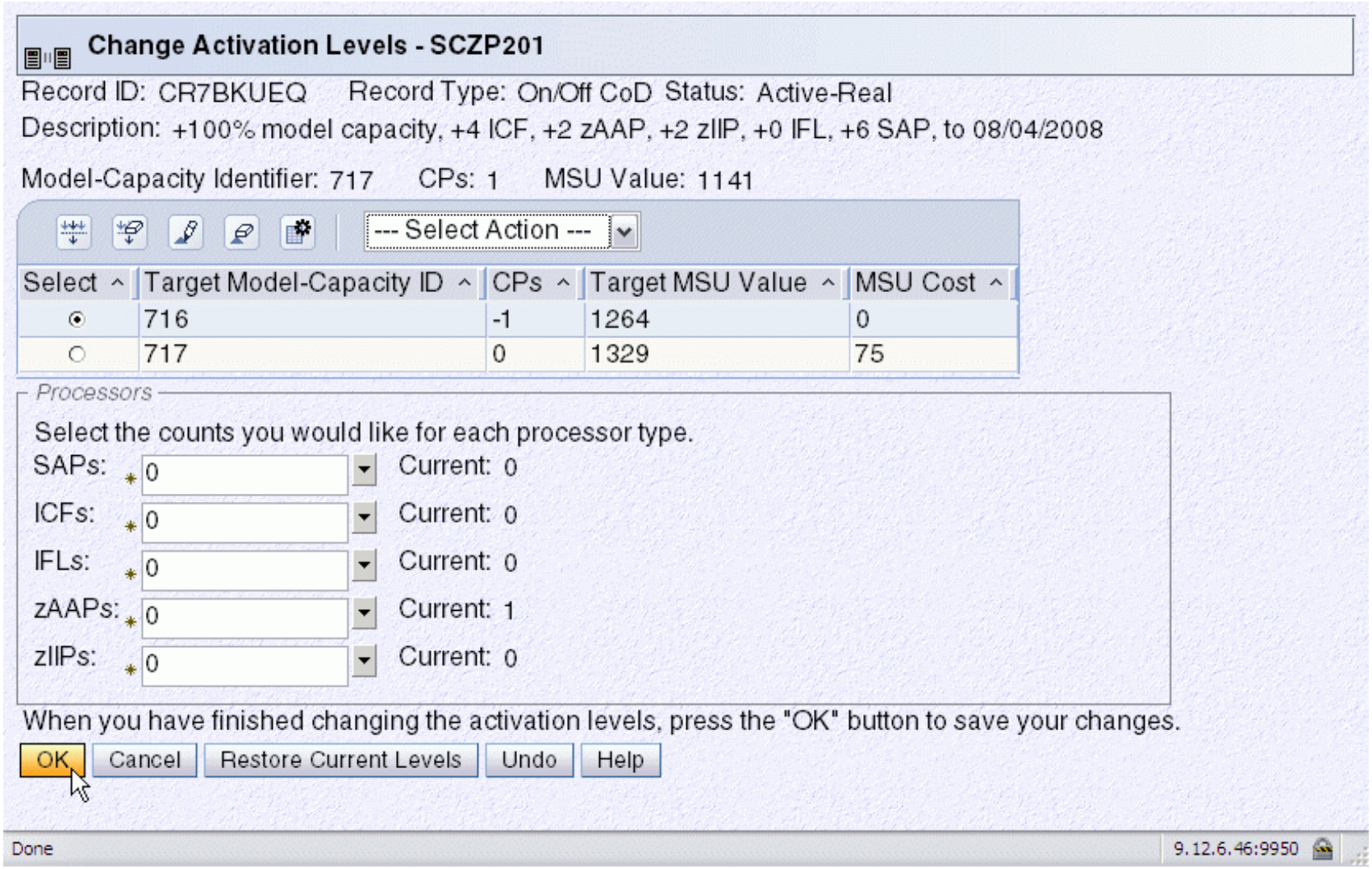
Multiple active temporary records - example



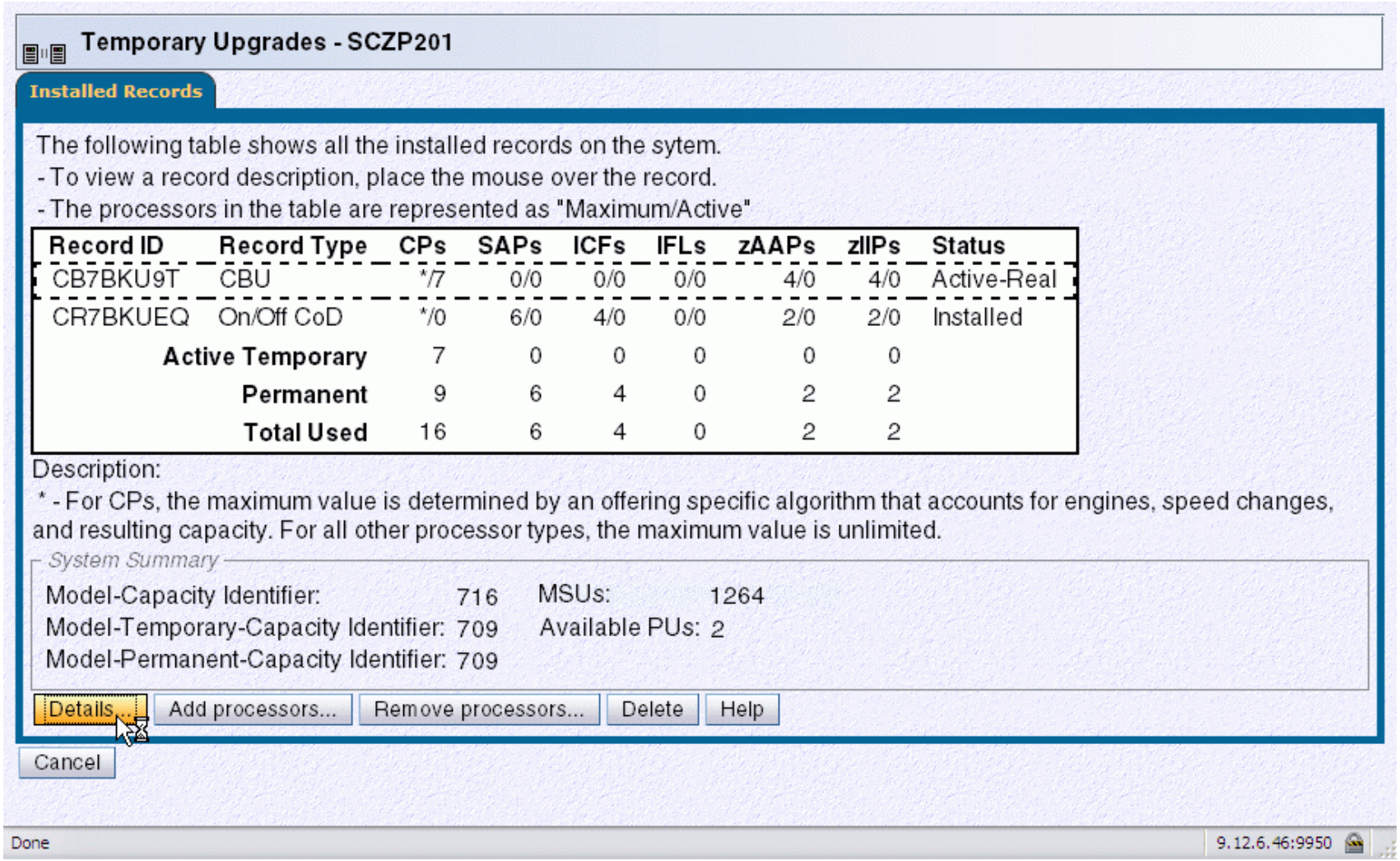
Multiple active temporary records - example



Multiple active temporary records - example



Multiple active temporary records - example

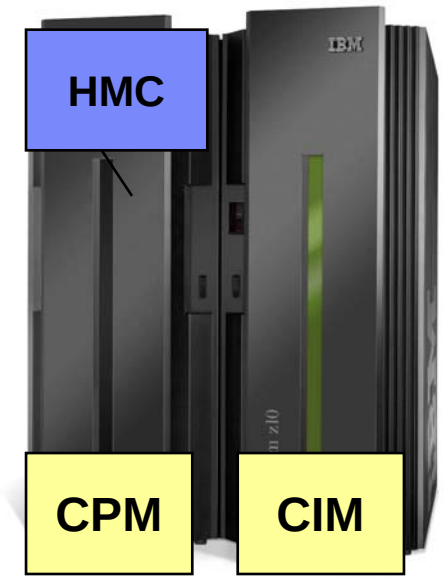


Agenda

- The Basics - Capacity on Demand
- Elements of the Offerings
- Capacity Back Up
- Capacity for Planned Events
- On/Off Capacity on Demand
- Capacity Provisioning Manager

z/OS Capacity Provisioning

Capacity Provisioning Control Center - CPCC



Domain Configuration(s)

Policies

Capacity Provisioning Manager – CPM

Common Information Model - CIM

Files

Provisioning Architecture

z/OS 1.9 or higher

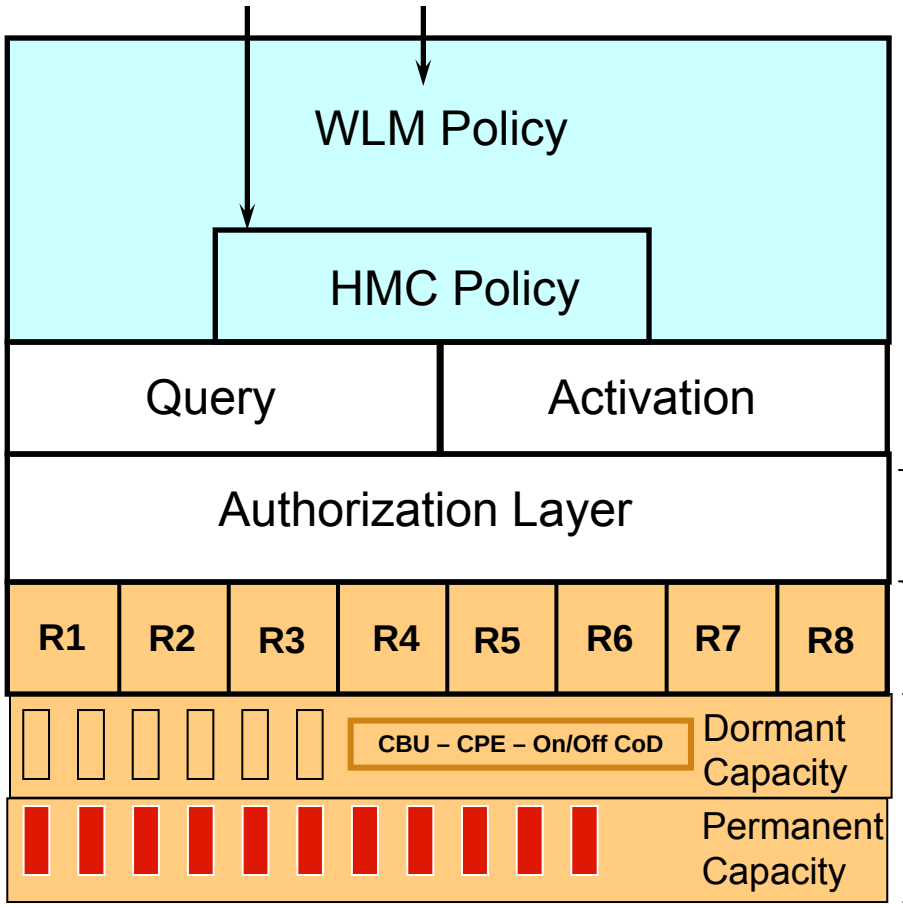
Capacity Provisioning Manager
&
Capacity Provisioning Policy

When
Which work
How much additional capacity

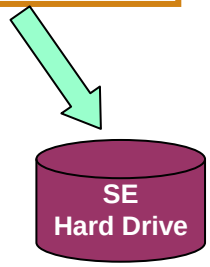
Implementation Steps

Manual - Analysis - Confirmation – Autonomic

Customer defined policy or manual operations



Orders downloaded from Retain/media



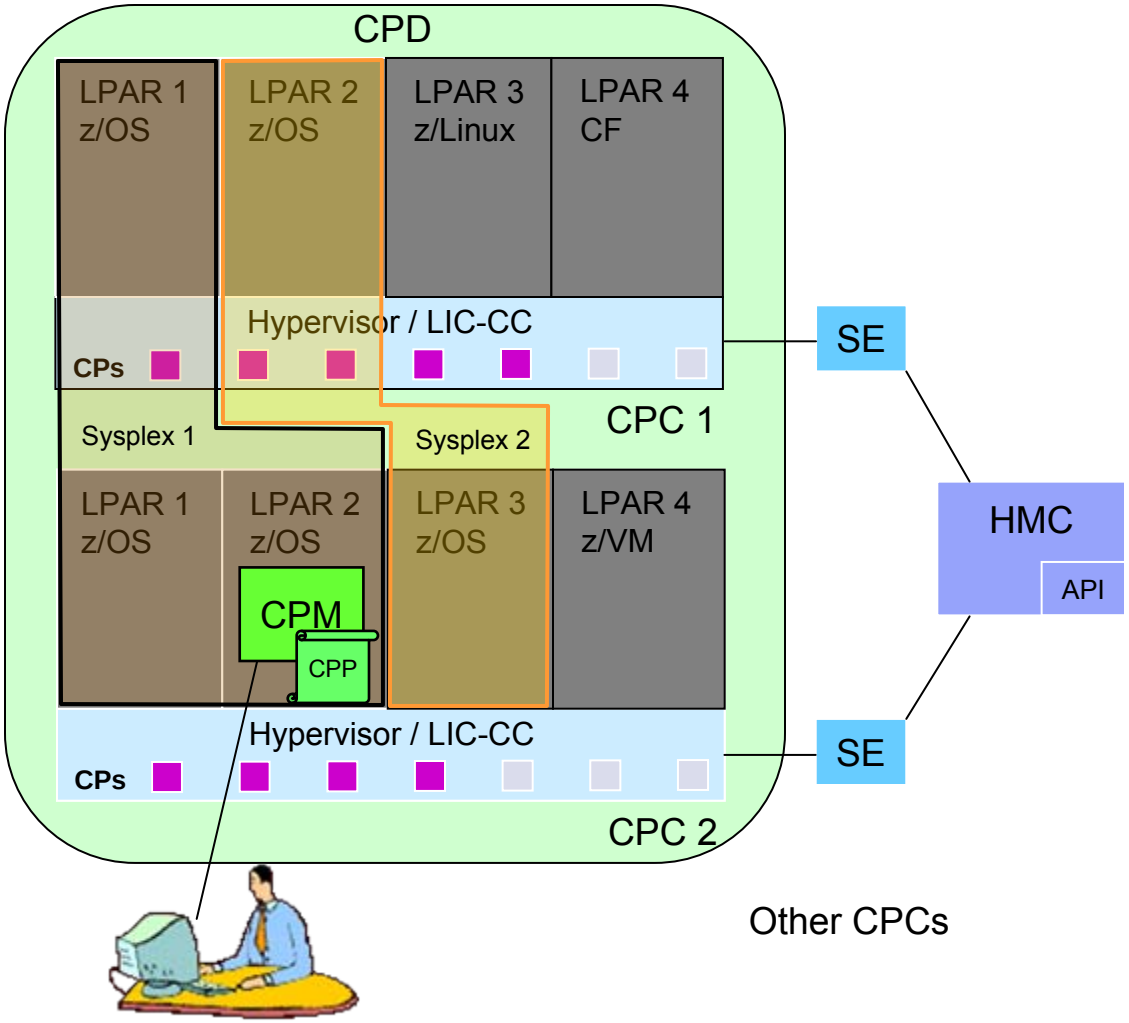
- Enforce Terms and Conditions
- Enforce physical model limitations
- Token aware

- Up to 8 temporary capacity records
- Customer assigns

- Base Model
- Change permanent capacity via MES order

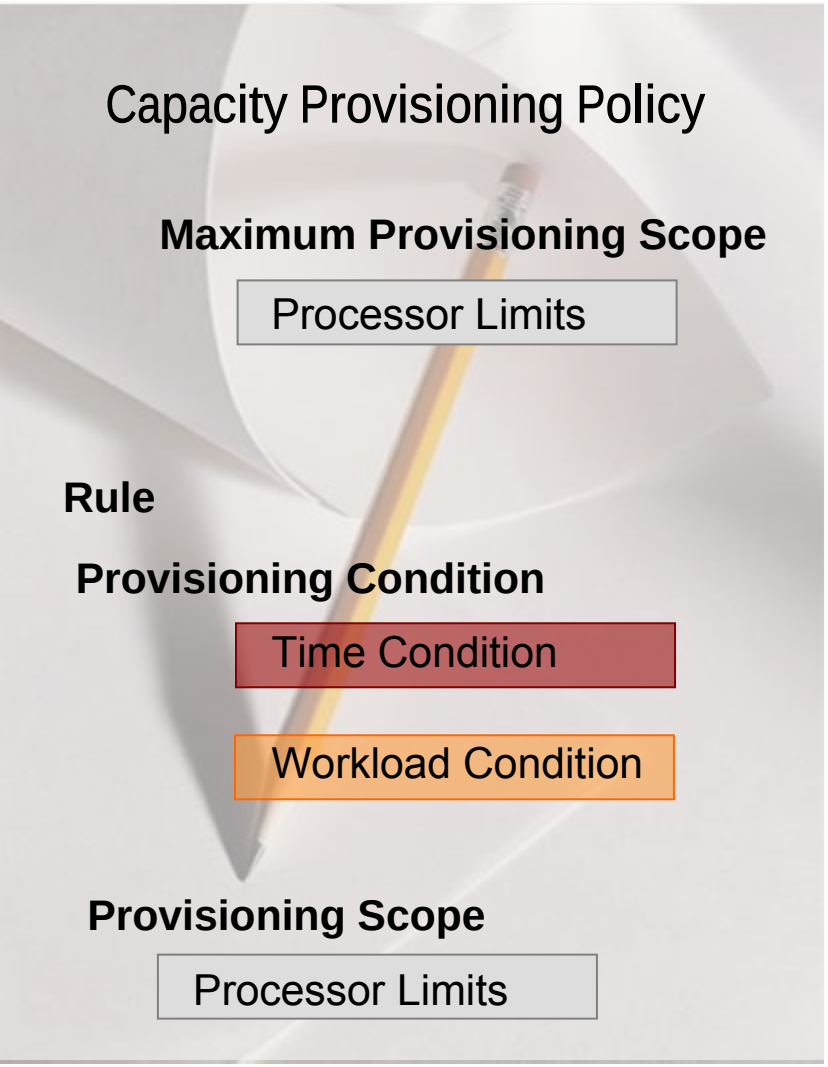
http://www-03.**ibm.com**/servers/eserver/zseries/zos/wlm/cp/

The Capacity Provisioning Domain



- The domain configuration defines CPCs and z/OS systems that are controlled by a CPM instance
- Sysplexes do not have to be completely contained in a domain but must not belong to more than one domain
- Multiple Sysplexes and hence multiple WLM service definitions may be involved
- One active Capacity Provisioning Policy (CPP) per Domain at a time
  - More than one policy can exist for different purposes

Capacity Provisioning Policy



- A policy may consist of multiple rules
  - Based on a variety of things, such as specific applications (bank transactions for example)
- The "Maximum Provisioning Scope" defines the maximum additional capacity that may be activated at any time for all contained rules
  - Expressed in MSUs, zIIPs, zAAPs
- "Provisioning Condition" is simply a group of Time and Workload Conditions that can be referred to
  - WLM Service Class conditions
  - Time Condition (start/deadline/end)
  - Workload (critical workload conditions)
- "Provisioning Scope" defines the maximum capacity that may be activated
  - Expressed in MSUs, zIIPs, zAAPs

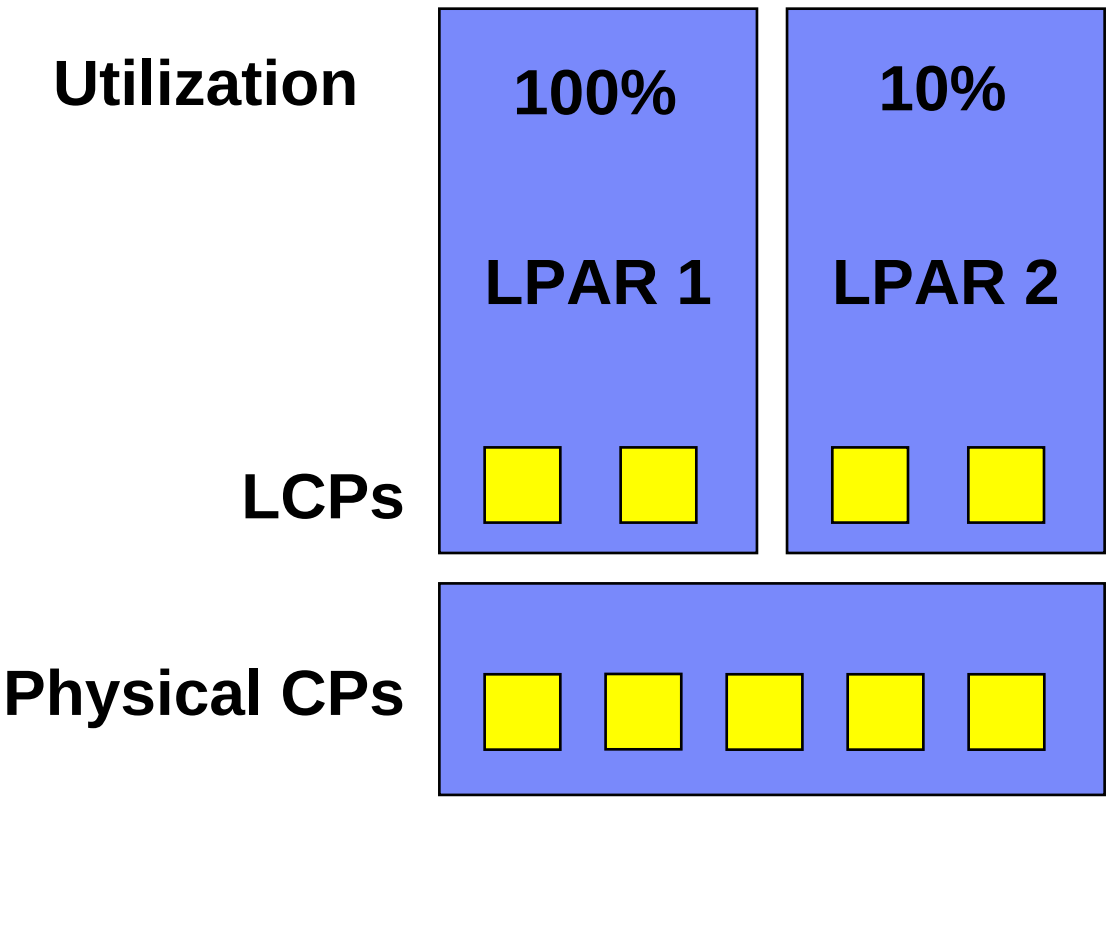
CPM – Processing Modes

- The CPM operates in either of these four modes:
  - Manual mode
    - This is basically a command driven mode where no CPM policy is active
  - Analysis mode
    - CPM processes the capacity provisioning policy and informs the operator when a provisioning / deprovisioning action would be due according to the criteria specified in the policy. It is up to the operator either to ignore that information or to perform the up/downgrade manually (using the HMC/SE or the available CPM commands)
  - Confirmation mode
    - CPM processes the policy as well as the On/Off CoD record to be used for capacity provisioning. Every provisioning action needs to be authorized (confirmed) by the operator
  - Autonomic mode
    - Similar to the preceding mode, except that no human (operator) intervention is required.
- In all modes:
  - Various reports will be available with information about workload and provisioning status, and the rationale for provisioning recommendations
  - User interface through
    - z/OS system console and CP control center application

Shared CPs

- Currently, CPM will only recognize a provisioning action if:
  - the current sum of logical processors is greater than or equal to the target number of physical processors in the respective pool
- Capacity Provisioning does not configure reserved or offline processors online to an LPAR
  - CF CPU(05),ONLINE

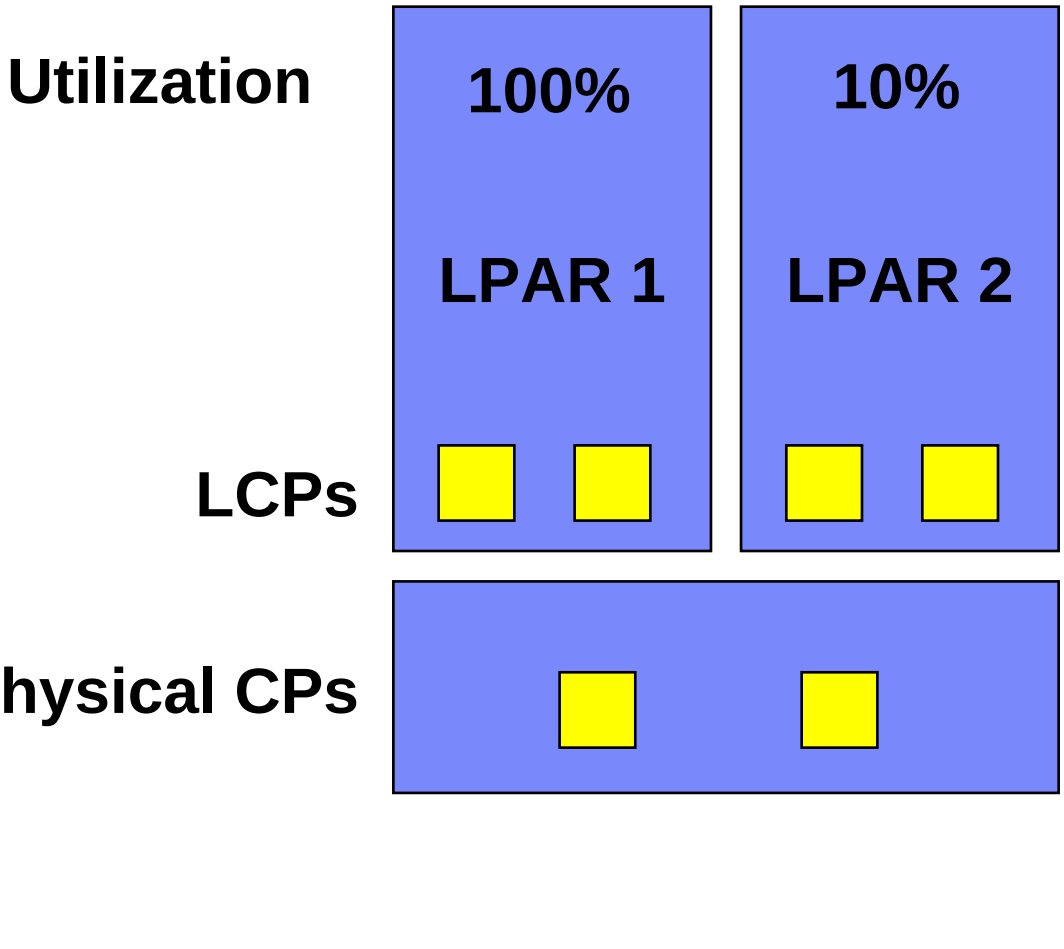
Shared CPs



Adding a Physical CP will not help LPAR1, thus CPM will not activate/provision an On/Off CoD record.

The current sum of logical processors is less than the target number of physical processors in the respective pool.

Shared CPs



Adding a Physical CP will help LPAR1, thus CPM will activate/provision an On/Off CoD record….. one CP at a time until it stops suffering.

The current sum of logical processors is greater than or equal to the target number of physical processors in the respective pool.

Dedicated CPs

- An “observed” system may run in a shared or dedicated LPAR
- A Dedicated engine can benefit only by increasing the capacity level
  - CPM can only add physical processors to the shared pool
  - CPM cannot help an LPAR defined with dedicated engines by adding physical processors to the shared pool so it will not automatically provision another CP, even if the LPAR is suffering.
    - Dedicated CP capacity-indicator can be increased
- No support for dedicated specialty engines in an LPAR

Reports, Logs, Audit Trails

- **CPM Reports**
  - Activity & Workload reports can be directed to CPM files and archived
- **CPM Logging**
  - Metrics, decisions and other data can be logged
- **Audit Trails**
  - Processor model and capacity changes can be recorded, outside of CPM
    - SMF22
    - RMF 70.1

Supported Environments and Prerequisites

- One or more z196, z114 and/or z10 servers
  - On/Off Capacity on Demand - enablement feature
- Hardware Management Console
  - TCP/IP connection to HMC must be available
- Multi-LPAR Environments
  - Sufficient number of logical CPs to utilize additional physical CPs
- z/OS Release 9 (on any observed system)
  - RMF or like product
  - RACF or like product
  - CPM not supported when z/OS is a z/VM Guest
- CPCC Workstation
  - An INTEL Pentium® or equivalent processor with 512 MB memory (1 GB recommended)
  - Microsoft Windows XP Professional - Service Pack 2 or later
  - Microsoft Vista – via z/OS V1.12
  - Screen resolution 1024x768 or higher
  - Browser monitoring planned via browser in z/OS V1.13

Statement of Direction

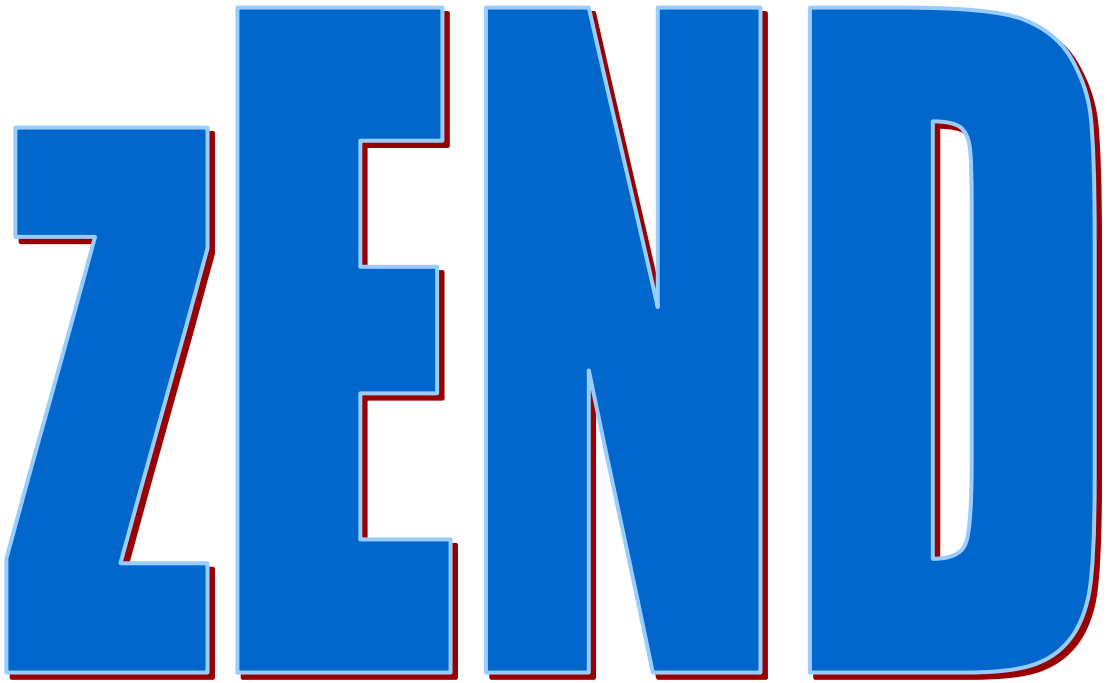
February 15, 2011

- z/OS V1.13 is planned to be the last release to provide the z/OS Capacity Provisioning support that utilizes the System z API for communication with the Support Element (SE) or Hardware Management Console (HMC). This protocol is based on IP network connection using SNMP.
- IBM recommends configuring the Capacity Provisioning Manager for communication via the z/OS BCP Internal Interface (BCPii) protocol. The SE and HMC support for the System z API remains, and is not affected by this withdrawal of support.

Resources

- Capacity on Demand
  - zEnterprise Capacity on Demand User's Guide, SC28-2605
  - z10 Capacity on Demand User's Guide, SC28-6871
  - z10 Capacity on Demand Redbook, SG24-7504
  - www.ibm.com/systems/z/cod/
- z/OS Capacity Provisioning
  - z/OS MVS Capacity Provisioning Manager User's Guide, SA33-8299
  - http://www-03.ibm.com/servers/eserver/zseries/zos/wlm/cp/

Questions?



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