

Accelerated Value Knowledge Share: ITM - Adaptive Monitoring

 Tivoli[®] software



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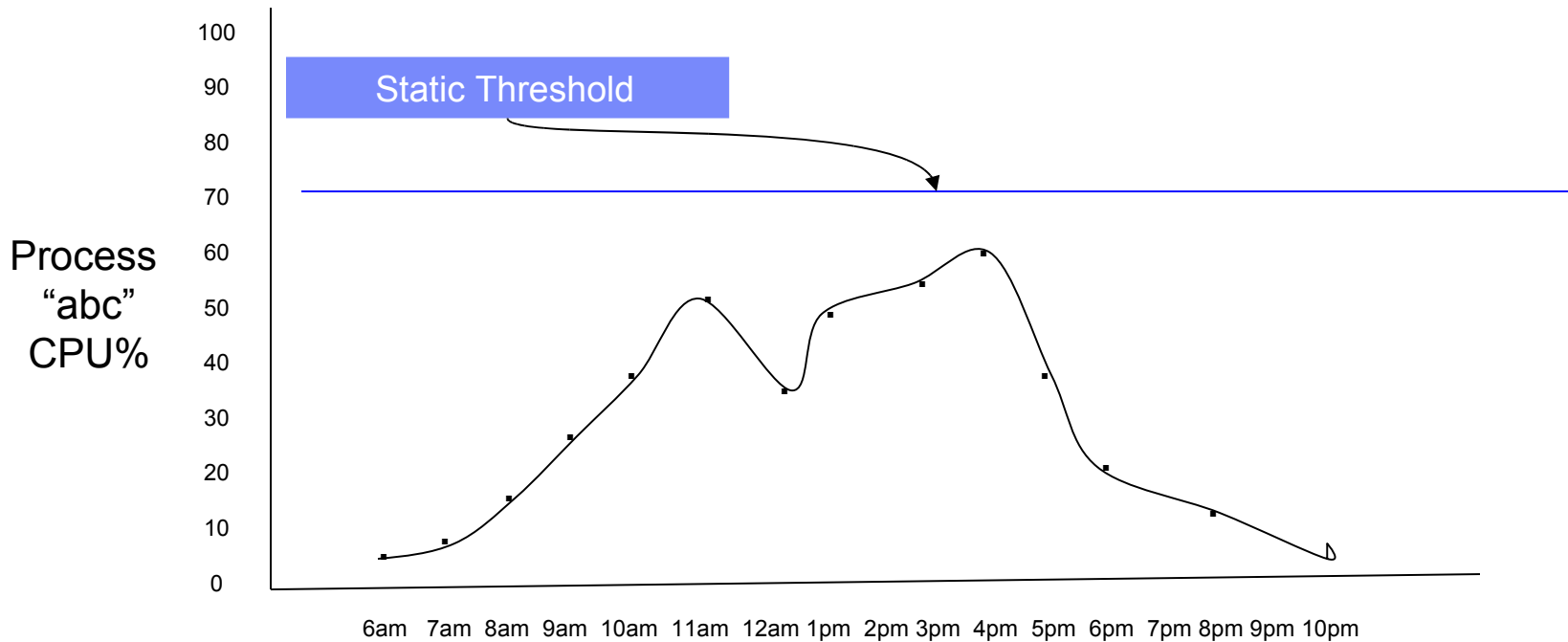
Agenda

- Adaptive Monitoring
 - Benefits
 - Terminology
- Dialog Windows
 - Situation Override
 - Eligibility
 - Scheduling
 - Baselines / Models
- Troubleshooting
- Technotes and APARs
- Command Line
 - OPAL Script
- Demonstration
- Q&A

Adaptive Monitoring Benefits

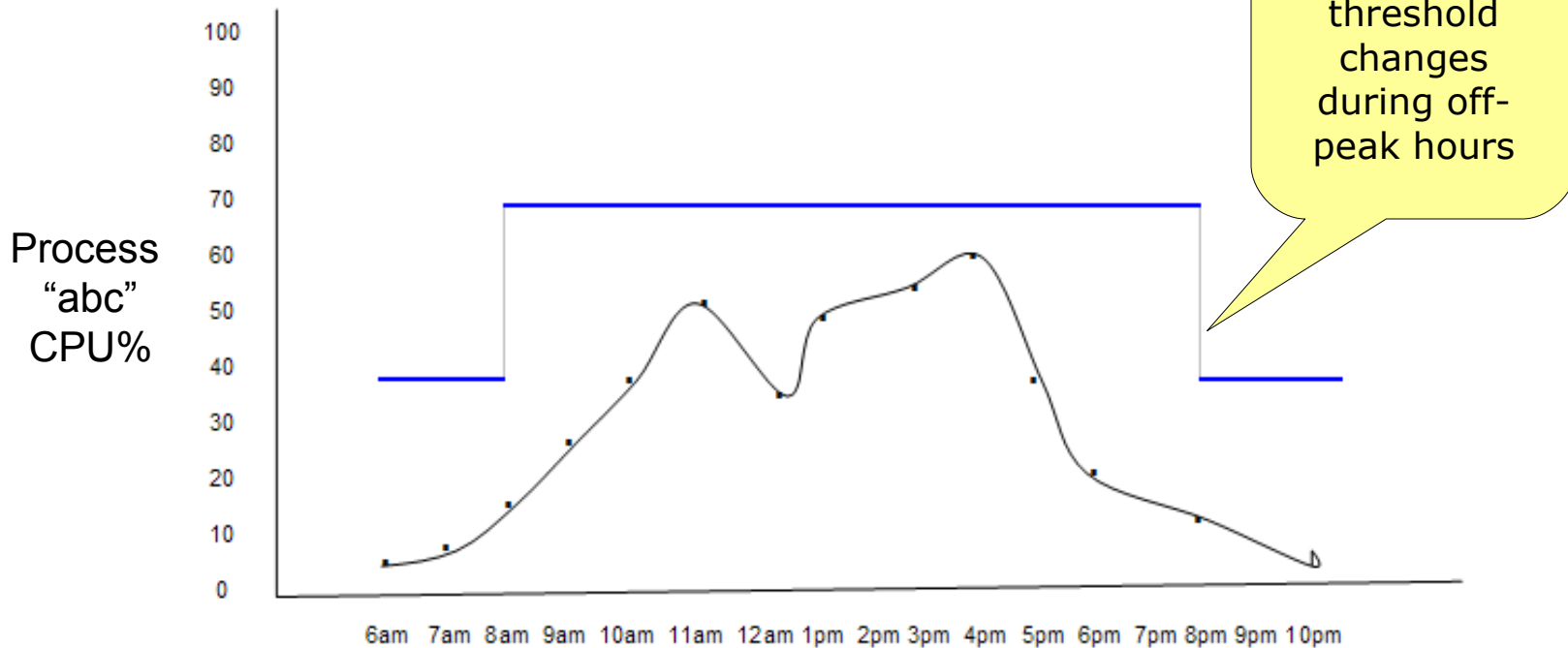
- Granular control of situations
- Override threshold and configuration settings based on the needs of the individual resource, line of business, geographic location, etc.
- Create time-sensitive thresholds (calendar-based).
- Calculate baseline values using statistical functions for a situation attribute based on historical data

Fixed Threshold Monitoring



- No automated approach to define
- No warning of abnormal behaviors prior to peak periods
- No flexibility in the monitoring environment

Dynamic Thresholds



- ✓ Automated definitions with + or - variation using baselining
- ✓ Proactive warning when abnormal behavior occurs during nonpeak periods
- ✓ Scripting can provide automated updates when changes take place

Terminology

- Situation Modeling – calculate a proposed threshold based on historical data
- Situation Override – a situation or schedule distributed to an agent overrides a situation distributed to a list
- Dynamic Thresholding – threshold changes are determined by schedule
- Situation Override and Dynamic Thresholding are often used interchangeably

TEP Situation Override Editor – entry point: Situation Editor

The screenshot shows the 'Situation Editor' window. On the left is a tree view of situations, with 'Process_High_CPU' selected. A yellow callout bubble points to it with the text: 'Situation selected from situation editor to be overridden'. The right pane shows the configuration for this situation:

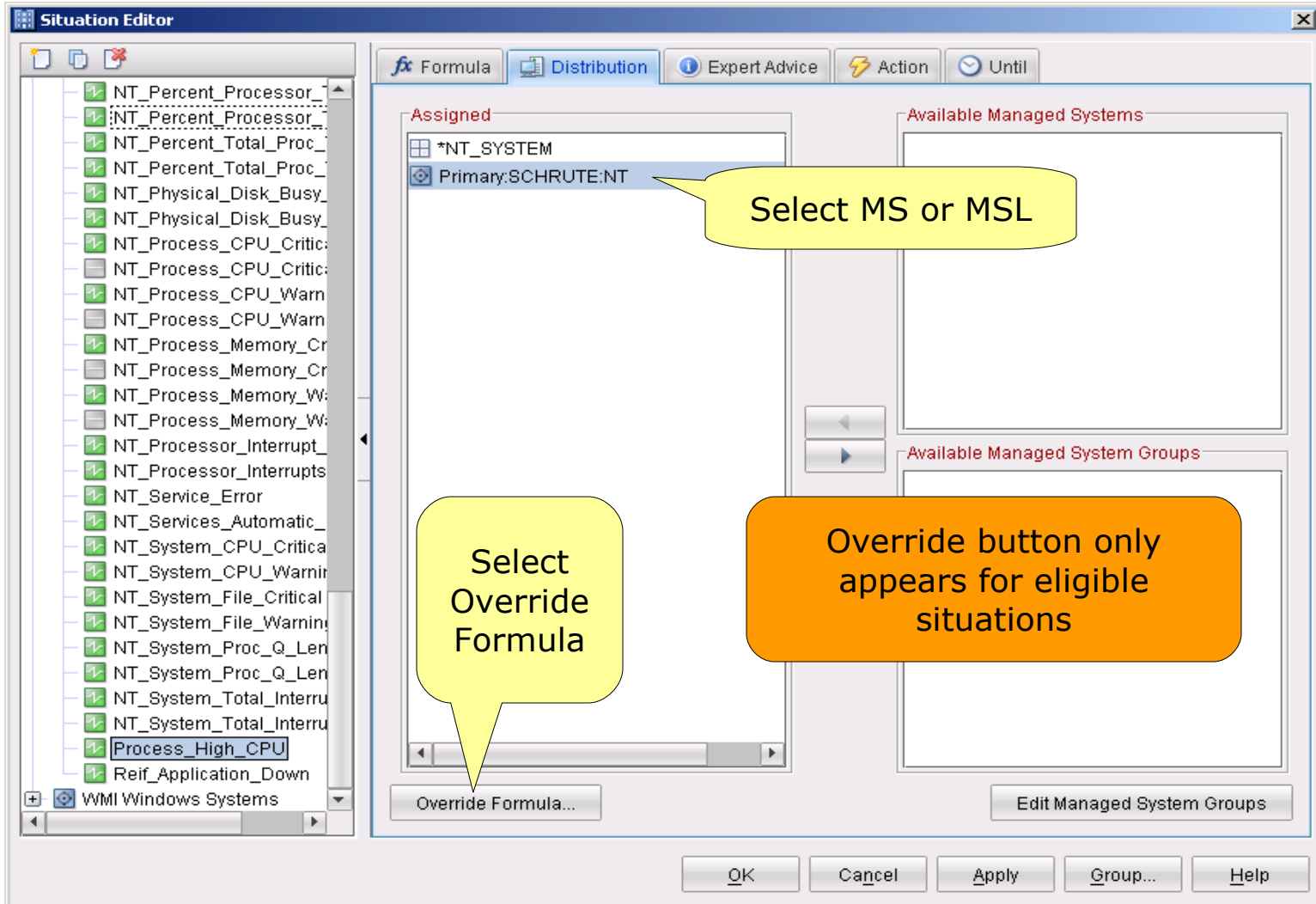
- Name:** Process_High_CPU
- Description:** Percent of processor time used by this process. This situation
- Formula:** A table with columns: % Processor Time, Priority Base, and Process Name.

	% Processor Time	Priority Base	Process Name
1	>= 65	= 0	= '_Total'
2			
3			

 A yellow callout bubble points to the 'Process Name' cell of the first row with the text: 'Situation formula to be overridden'.
- Formula editor:** Includes a progress bar for 'Situation Formula Capacity' at 13% and buttons for 'Add conditions...' and 'Advanced...'.
- Sampling interval:** Set to 0 / 0 : 15 : 0 (ddd hh mm ss). A checkbox for 'Run at startup' is checked.

At the bottom of the window are buttons for 'OK', 'Cancel', 'Apply', 'Group...', and 'Help'.

TEP Situation Override Editor – entry point: Situation Editor



Override Eligible Situations

- The following types of situations are override INELIGIBLE. No parts of these situation formulas are allowed to be overridden.
 - Embedding situations (situations that embed other situations)
 - Correlated situations (these are only executed at the Hub TEMS)
 - Situations that are ONLY distributed to the TEMS
 - Situations containing multi attribute group formulas (multiple tables)
 - Situations containing expressions involving column functions
 - *MIN, *MAX, *AVG, *SUM, *COUNT, *CHANGE, *PCTCHANGE
 - Situations containing expressions involving the following row functions:
 - *STR, *SCAN, *MISSING, *TIME, *DATE

Override Example

Notice the same situation is twice distributed to an agent from an MSL and to the individual agent. The MSL assigned situation has no schedule but the individual agent does have an override schedule.

This screenshot shows the 'Situation Editor' interface. The 'Assigned' list contains '*NT_SYSTEM' and 'Primary.SCHRUTE:NT'. The 'Reference formula' table is shown below:

% Processor Time	% Processor Time	Priority Base	Pr
>= 50	< 65	= 0	=

A yellow arrow points from the 'Expressions' tab to the table. A black callout box with white text says "No schedule assigned".

This screenshot shows the 'Situation Editor' interface with an override schedule. The 'Assigned' list contains '*NT_SYSTEM' and 'Primary.SCHRUTE:NT'. The 'Reference formula' table is shown below:

% Processor Time	% Processor Time	Priority Base	Process Name
>= 50	< 65	= 0	=_Total

The 'Formula overrides' section shows a table with an override:

% Processor Time	% Processor Time	Priority Base	Process Name
>= 35	< 65	= 0	=_Total

A yellow arrow points from the 'Expressions' tab to the override table. A black callout box with white text says "Override schedule is assigned".

Situation Override Editor

Add Expression Overrides

Process_High_CPU
Primary:SCHRUTE:NT

Selected distribution for override (MS or MSL)

Reference formula

Table View Graphic View

% Processor Time	Priority Base	Process Name
>= 65	!= 0	!= '_Total'

Situation formula being overridden (reference formula)

Formula overrides

Expressions Details

fx >= 35

% Processor Time	Priority Base	Process Name
>= 35	!= 0	!= '_Total'

Highlighted items represent overridden values <threshold>

Calendar condition – select this icon to enter the calendar dialog

Calendar condition hoverhelp displays calendar entry name

Override schedule assigned: NonPrimeShift

Add Expression Remove Expression Model Expression...

% Processor Time The percentage of elapsed time that a process has used the processor to execute instructions. Valid values are positive integers that can include the use of the *AVG, *MIN, *MAX, or *SUM functions. (Superseded.)

There is an inconsistency between the way that the Process report calculates the percentage of processor time used by a process, and the way that the Windows Performance Monitor

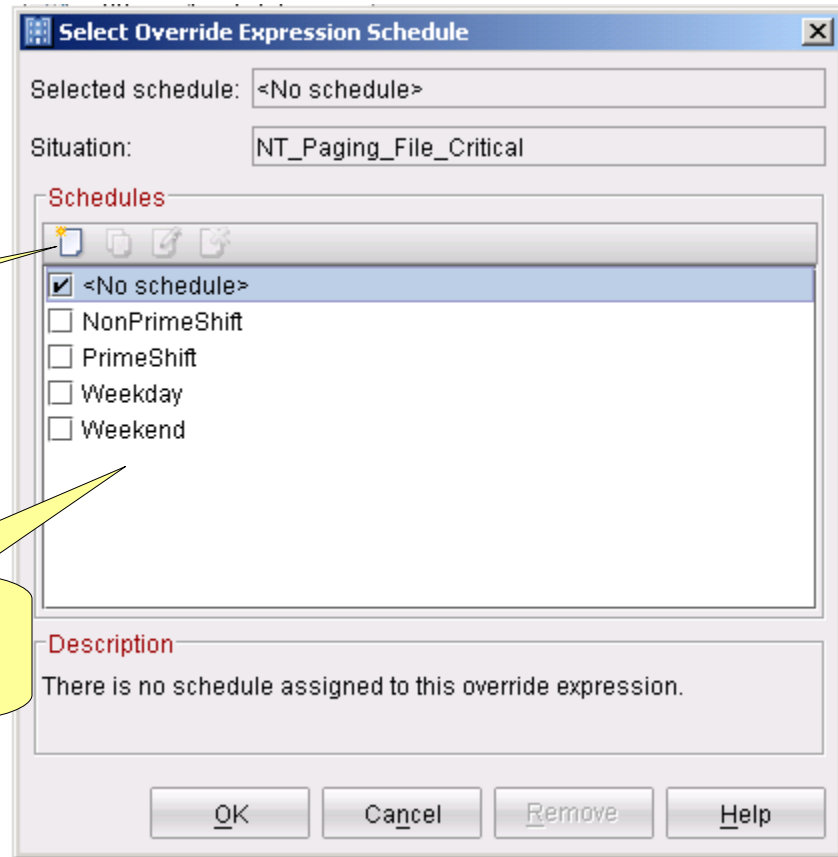
OK Cancel Apply Remove Help

Schedule Dialog

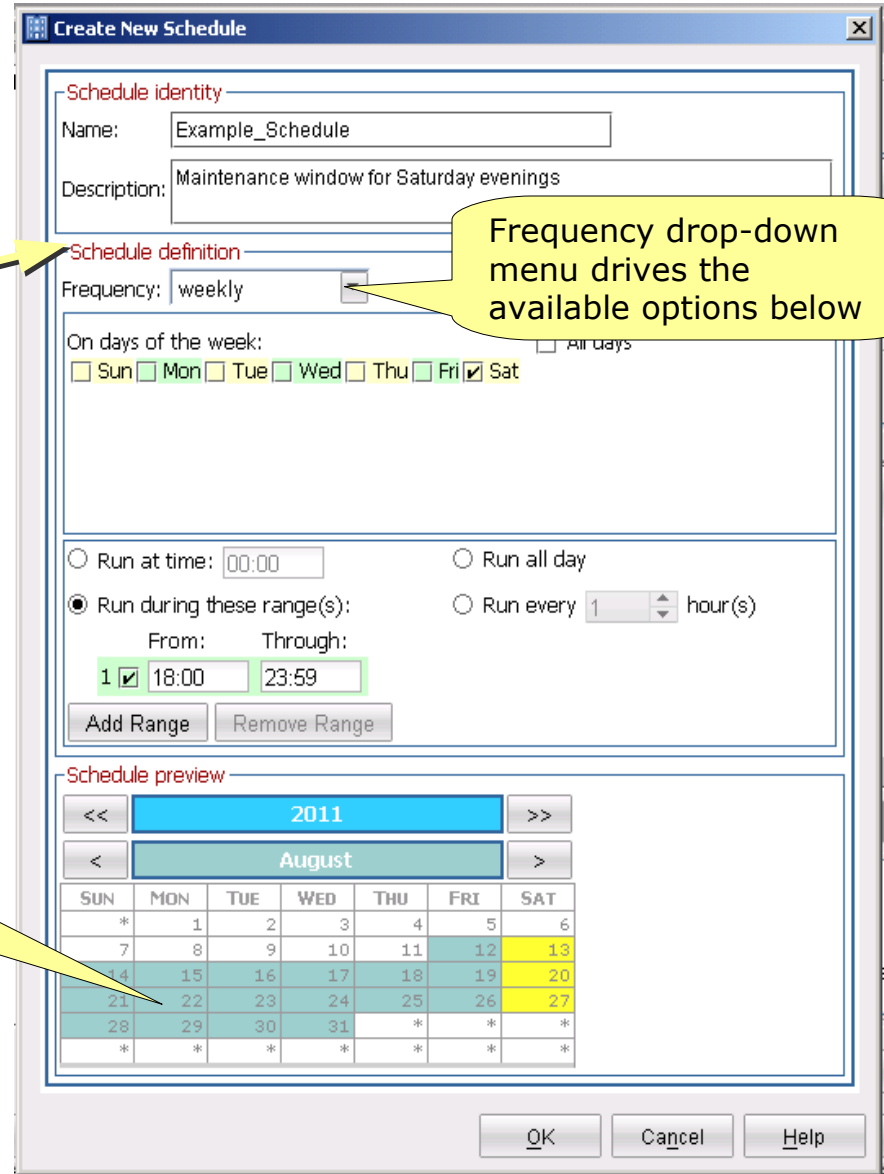
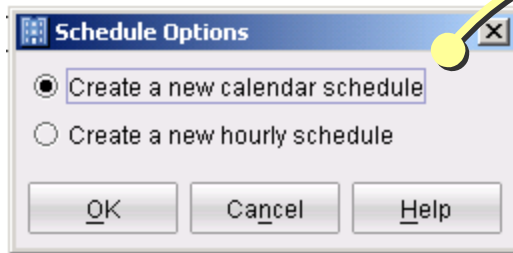
- Access this window from the calendar icon on previous slide

Select the "Create New Schedule" button in upper left corner

Four default schedules listed



New calendar schedule dialog



Color changes driven by choices. Yellow entry is an affected day.

New Hourly Schedule Dialog

Schedule Options

Create a new calendar schedule

Create a new hourly schedule

OK Cancel Help

Create New Schedule

Schedule identity

Name: 02:00-03:00

Description: Daily schedule between 02:00 and 03:00

Schedule definition

Start time: 02:00

Stop time: 03:00

Schedule preview

<< 2011 >>

< August >

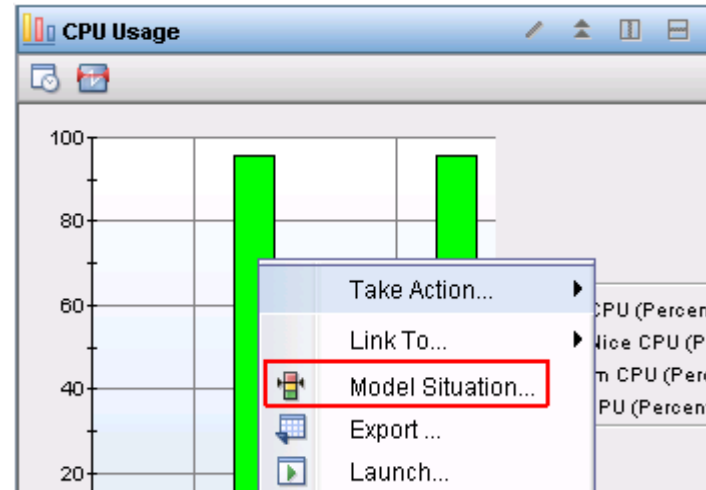
SUN	MON	TUE	WED	THU	FRI	SAT
*	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31	*	*	*
*	*	*	*	*	*	*

OK Cancel Help

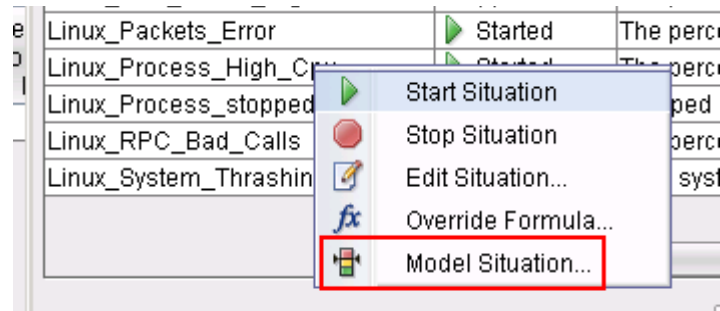
Note: Name is driven by schedule definition values

Enter Situation Modeling Dialog

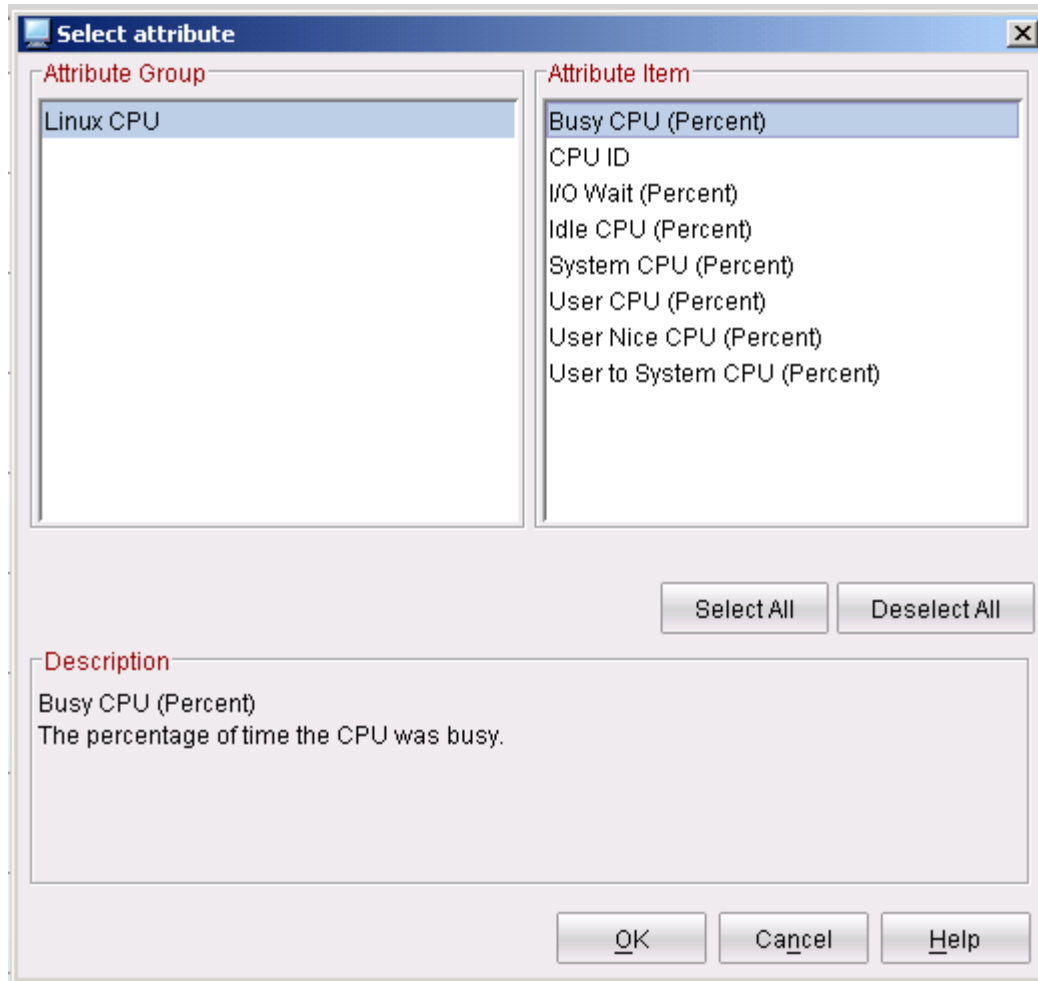
- Right-click data in a chart or table
(Good for creating a new situation)



- Right-click a situation in the Manage Situations window



Create new situation from table or chart



- Select one or more attributes

Model Situation Dialog

The screenshot shows the 'Model Situation' dialog box. At the top is a line graph with a y-axis from 0 to 100 and an x-axis showing dates from 08/1/11 15:00 to 08/1/21/1 14:00. A blue line represents '% Processor Time' and an orange horizontal line represents 'MAX +85 %'. Below the graph are two tables: 'Attributes' and 'Functions'. The 'Attributes' table has one row: '% Processor Time' with condition '> 72' and value modifier '< none selected >'. The 'Functions' table has one row: 'MAX' with argument '+ 85 percent' and result '72'. At the bottom are buttons: 'Recalculate', 'Create Situation...', 'Reset', 'Cancel', and 'Help'. Five yellow callout boxes with numbered steps point to specific elements in the dialog.

Name	Condition	Value modifier
% Processor Time	> 72	< none selected >
<input checked="" type="checkbox"/> Processor	== '_Total'	

Name	Argument	Result
<input type="checkbox"/> AVG	+/- 0 standard deviation	
<input type="checkbox"/> MIN	+/- 0 percent	
<input checked="" type="checkbox"/> MAX	+ 85 percent	72
<input type="checkbox"/> PERCENTILE	50	

1. select attribute

Change Time Span options here

2. select function and arg value

4. paste

3. recalculate

5. create situation

Centralized Management of Dynamic Thresholds

- Calendar entries
 - stored in O4SRV.TCALENDAR table on the TEMS
 - Distributed by the TEMS to every override-enabled agent's override XML file every time a calendar entry is added, modified, or deleted

- Overrides
 - stored in the O4SRV.TOVERRIDE, O4SRV.TOVERITEM tables on the TEMS
 - distributed by the TEMS to each *impacted* agent every time an override is added, modified, or deleted (for MSL-level overrides, the overrides are distributed to every override-eligible agent in the MSL)

Agent Override XML Files

- Each agent's override XML file is located in the TMAITM6 directory
 - naming convention: <pseudo_MSN>_THRESHOLDS.XML
 - colons (:) in MSN replaced by underscores (_), e.g.
"Primary_LEVER_NT_THRESHOLDS.XML" for MSN "Primary:LEVER:NT",
"Lever_UA_THRESHOLDS.XML" for MSN "Lever:UA"
- Agent reads the file during startup, when file is updated
- Contains calendar entries defined on the TEMS
- Contains all dynamic thresholds set for that managed system *or* the managed system list that the managed system belongs to
 - Dynamic thresholds set for the *MSN* (priority=100) take precedence over dynamic thresholds set for the *MSL* (priority=200) that the MSN belongs to
- Each file contains a checksum
- Any manual user edits to the file will be *lost* when the agent is restarted or when a calendar entry or override change notification occurs

Agent Override XML File - example

```
<?xml version="1.0"?>
```

```
<overrides>
```

```
  <calendar name="NonPrimeShift" cron="* 0,1,2,3,4,5,6,7,8,17,18,19,20,21,22,23 * * 1-5"
    lastupdate="1081025210150000" ></calendar>
```

```
  <calendar name="PrimeShift" cron="* 8-17 * * 1-5" lastupdate="1081025210149000" ></calendar>
```

```
  <calendar name="Weekday" cron="* * * * 1-5" lastupdate="1081025210149000" ></calendar>
```

```
  <calendar name="Weekend" cron="* * * * 0,6" lastupdate="1081025210149000" ></calendar>
```

```
  <calendar name="Z90B87E74CD22529992ABC57FC2A3341" cron="* 8-9 * * 1-5"
    lastupdate="1081031163415000" ></calendar>
```

```
  <calendar name="Z90B88BA4F834032D8E42BD744EAF466" cron="* 9-10 * * 1-5"
    lastupdate="1081031163746000" ></calendar>
```

```
  <calendar name="Z90B88BB4F866A2F5357622A35BE5E06" cron="* 10-11 * * 1-5"
    lastupdate="1081031163747000" ></calendar>
```

```
  <calendar name="Z90B88BC4F89142B191F402A5E096D5C" cron="* 11-12 * * 1-5"
    lastupdate="1081031163748000" ></calendar>
```

```
  ...
```

Agent Override XML File - example (continued)

```

<situation name="Process_High_CPU" priority="100"
  OBJNAME="Process_High_CPE97BD8763CAC42B4" >
  <key column="INSTCNAME" value="java">
    <threshold column="PCTPRCSTME" value="95" operator="GT" ></threshold>
  </key>
  <key column="INSTCNAME" value="kdsmain">
    <threshold column="PCTPRCSTME" value="25" operator="GT" ></threshold>
  </key>
  <default>
    <threshold column="PCTPRIVTME" value="40"
      calendar="Z90B87E74CD22529992ABC57FC2A3341" operator="GT" ></threshold>
    <threshold column="PCTPRCSTME" value="80"
      calendar="Z90B87E74CD22529992ABC57FC2A3341" operator="GT" ></threshold>
  </default>
</situation>

```

MSN-level override

MSL-level override

```

<situation name="Process_High_CPU" priority="200"
  OBJNAME="Process_High_CPF78184522FDD481F" >
  <threshold column="PCTPRCSTME" value="80"
    calendar="Z90B88BD4F8D3E285EE71E296537CB36"
    operator="GT" ></threshold>
</situation>

```

```

</overrides filesum=32674 >

```

File Checksum

Troubleshooting Dynamic Thresholding - Agent Level

- If calendar entries or situation overrides don't appear to be getting to the agent (e.g. aren't showing up in the agent's override XML file), check the agent's operations log
 - Calendar and threshold adds/deletes/updates appear in the operations log
 - Ops log entries are made by default, no tracing levels necessary
 - Ops log file location:
 - %CANDLE_HOME%\TMAITM6\logs\e.g. C:\IBM\ITM\TMAITM6\logs\Primary_LEVER_NT.LG0
 - \$CANDLEHOME/logs/<MSN>.lg0
e.g. /opt/IBM/ITM/logs/lever:lz.lg0

Troubleshooting Dynamic Thresholding - Agent Level

- If a dynamic threshold appears in the agent's override XML file, but doesn't appear to be working properly, set the following trace for the agent:

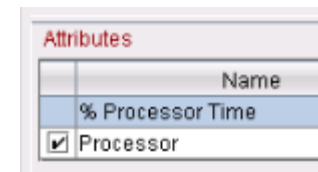
ERROR(UNIT:krathagt ALL) (UNIT:kracaagt ALL) (UNIT: kraacth ALL)

- Agent log file location:

- %CANDLE_HOME%\TMAITM6\logs*_nt_kntcma_*.log (Windows)
e.g. C:\IBM\ITM\TMAITM6\logs\LEVER_nt_kntcma_490b3b06-01.log
- \$CANDLEHOME/logs/*_lz_*.log (Linux)
(e.g. /opt/IBM/ITM/logs/lever_lz_klzagent_48738dc6-01.log)
- \$CANDLEHOME/logs/*_ux_*.log (Unix)
(e.g. /opt/IBM/ITM/logs/lever_ux_kuxagent_72184a3e-01.log)

Technotes & APARs

- Situation Override length is limited to 4,000 bytes and no check exists in the TEP client. Error appears in TEMS log:
 - (4C59FF0A.0000-6:ko4ovrd.cpp,168,"Override::Override") Error: Override
 - <IBM_check_ovr__3A44FD0A864C4350> sit <IBM_check_ovr> si
 - +4C59FF0A.0000 ze <5062> exceeds limit 4000
- In 6.2.1, situation overrides were distributed to all subnode agents. Fixed in 6.2.2.
- IZ95498 Document - Wildcards in the key value of the formula are not supported. Key values are listed with check marks to the left of the attribute name.



CLI commands

Commands introduced in ITM 6.2.1:

Calendar Management

- addcalendarEntry
- editCalendarEntry
- deleteCalendarEntry
- viewCalendarEntry
- listCalendarEntries
- exportCalendarEntries
- importCalendarEntries

Override Management

- listOverrideablesits
- listSitAttributes
- listOverrides
- setOverride
- deleteOverride

Univariate Baseline

- suggestBaseline
- acceptBaseline

http://publib.boulder.ibm.com/infocenter/tivihelp/v15r1/index.jsp?topic=%2Fcom.ibm.itm.doc_6.2.2fp2%2Ftacmd.htm&path=3_0_5_0_2

Script to update thresholds

- OPAL solution is a script that automates the process of updating the Dynamic Thresholds
 - <https://www-304.ibm.com/software/brandcatalog/ismlibrary/details?catalog.label=1TW10TM7F#>
- The tool evaluates the situations and determines which situations are already configured for dynamic thresholds. If the situation has overrides defined, then the tool will run using provided criteria and update the override settings. For example, the script will re-evaluate the recent historical data and update the threshold for one standard deviation.

Demo and Questions

Backup Slides

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Out-of-the-Box Calendar Entries

These calendar entries ship with ITM 6.2.1:

- PrimeShift

Monday to Friday between 8am and 5pm

* 8-17 * * 1-5

- NonPrimeShift

Monday to Friday before 8am and after 5pm

* 0,1,2,3,4,5,6,7,8,17,18,19,20,21,22,23 * * 1-5

- Weekday

Monday to Friday

* * * * 1-5

- Weekend

Saturday and Sunday

* * * * 0,6

CRON Format

Cron format is a simple, yet powerful and flexible way to define time and frequency of various actions. For the calendarentry commands, the data has to be specified in CRON format with **-c|--cron** option.

Traditional CRON format (supported by CLI) consists of five fields (quintuple value) separated by white spaces in the following order :

<Minute> <Hour> <Day_of_the_Month> <Month_of_the_Year> <Day_of_the_Week>

NOTE: The order is important in CRON spec. eg : <Hour> <Month> <Minute> <Day_Of_Month> <Day_Of_Week> is invalid.

The following graph shows what it should consist of:

* * * * *	ATTRIBUTE	VALID VALUES
+-->	Day of the Week	(range: 0-7) 0 and 7 stands for Sunday
+---->	Month of the Year	(range: 1-12)
+----->	Day of the Month	(range: 1-31)
+----->	Hour	(range: 0-23)
+----->	Minute	(range: 0-59)

NOTE: In **Month** and **Day_of_Week** fields, you can use name of month or day of week abbreviated to first three letters (Jan, Feb, ..., Dec or Mon, Tue, ..., Sun) instead of their numeric values. **But in that case, the user can specify ONLY one value. List and range of values are not allowed.** Eg "JAN, MAR" cannot be given.

CRON Format

There are several ways of specifying multiple date/time values in a field :

The comma (,) operator specifies a list of values, for example: "1,3,4,7,8"

The dash (-) operator specifies a range of values, for example: "1-6", which is equivalent to "1,2,3,4,5,6"

The asterisk (*) operator specifies all possible values for a field. For example, an asterisk in the hour time field would be equivalent to 'every hour' (subject to matching other specified fields).

There is also an operator which some extended versions of cron support, the slash (/) operator (called "step"), which can be used to skip a given number of values. For example, */3 in the hour time field is equivalent to "0,3,6,9,12,15,18,21". So * specifies 'every hour' but the */3 means only those hours divisible by 3.

addCalendarEntry and editCalendarEntry both take either a compact cron spec in standard format (with `-c|--cron` option), or named arguments giving each element of the cron spec by name. ie, If `-c|--cron` option is not used, the cron data can also be given using one or more of the (`-i|--min`; `-h|--hour`; `a|--daym|--dayofmonth`; `-m|--month`; `-w|--dayw|--dayofweek`) options. Missing named arguments default to the value ' * '.