

Building AI into Mainframe Batch Automation; can you afford not to?

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Compuware

November 2018
Session **NK**

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Agenda

- What's Artificial about Automation?
- What Batch Processing Challenges?
- What Batch Processing Opportunities?
- Why now? Nobody's died yet...
- Yes, you can automate 'Capping', but...
- OK – We've automated, but how do we know it's working?

What's Artificial about Automation?

Artificial Intelligence: In [computer science](#) AI research is defined as the study of "[intelligent agents](#)": any device that perceives its environment and takes actions that maximize its chance of successfully achieving its goals...

Source: [Poole, Mackworth & Goebel 1998](#), via Wikipedia

z/OS Environment Perception:

- Performance (Velocity, Performance Index)
- Utilisation (CPU, Resources)
- Availability (CPC, LPAR, software, hardware)

Actions to meet Batch Workload Completion Goals:

- Business critical Jobs prioritised
- CPC & Initiator performance optimised
- Unnecessary delays eliminated
- Service escalation when necessary

Meet TiM



What Batch Processing Challenges?

- Lack of innovation & investment
- Data volume growth – increased I/O & CPU demand
- Overnight window intrusion, internal & external
- Cost cutting targets – capacity limit setting
- Processor & I/O speeds increased – manual interventions still slow
- Knowledge of legacy systems & business relevance disappearing
- JES Exit maintenance skills becoming scarce
- JCL standards & change control still at user/owner level
- JES2 was a ‘Blank Slate’ and the blackboard still has large gaps...

JES2 Is Blank Slate

- JES2 does heavy lifting of spooling—kudos to IBM
- Otherwise, IBM gave us...
 - Initiators
 - Address space
 - JES2 code requests work to process and JES2 services as needed
 - Customer decides how many and where located
 - Job classes
 - Rudimentary means to classify and organize jobs
 - Customer decides how to exploit efficiently
 - Oh ... and Exits
 - Opportunity to be clever and daring
 - Customer decides how to make use of them



Results in Not So Blank Slate

- Initially, it worked well or was tolerable
- As volume and complexity increased, so did incidents
 - Job class structures and standards often became inadequate and unmanageable
 - Under/over-initiation of jobs
 - Race conditions
 - Competition for resources results in initiator idling
 - Resource hogging by industrious users
 - Defeatable JCL standards enforcement



What Batch Processing Opportunities?

- ‘All the right Jobs, not necessarily in the right order...’
- Form an Orderly Queue
- ‘More speed, less haste...’
- ‘Look after the pennies, and the pounds will look after themselves...’
- Don’t Delay!

What Batch Processing Opportunities?

1. Prepare the Queue



What Batch Processing Opportunities?

2. Review the Queue



What Batch Processing Opportunities?

3. Control the Queue



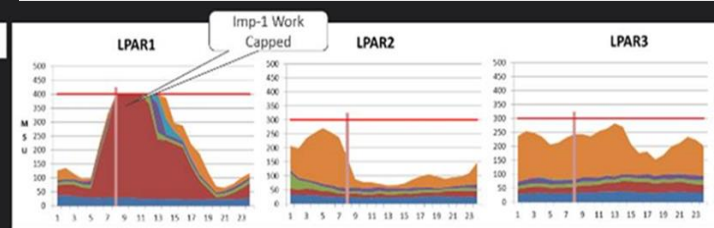
Why now? Nobody's died yet...



Yes, you can automate 'Capping', but...

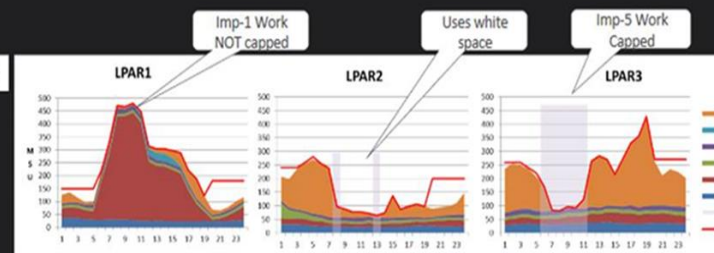
- What are you actually achieving?
- What do you really want to 'Cap'?
- Why react aggressively?
- Why not pre-empt peacefully?
- Why not target constraint gradually?

Without iCap

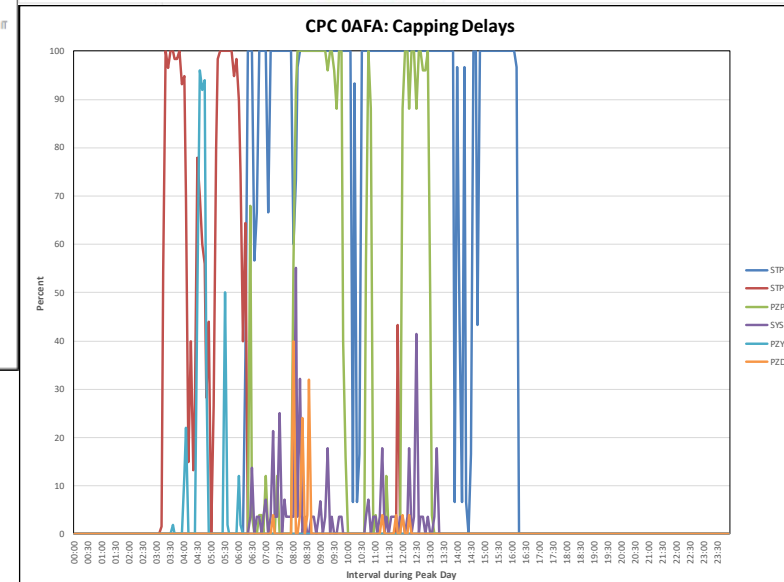
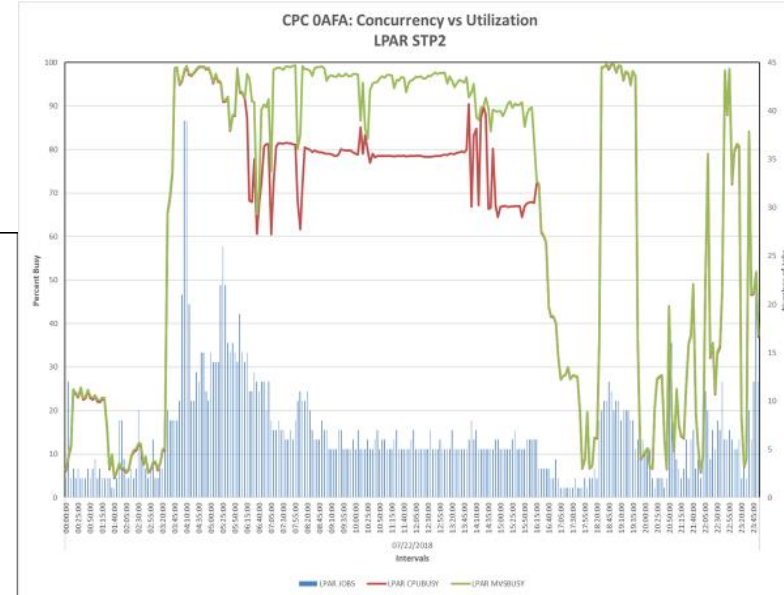
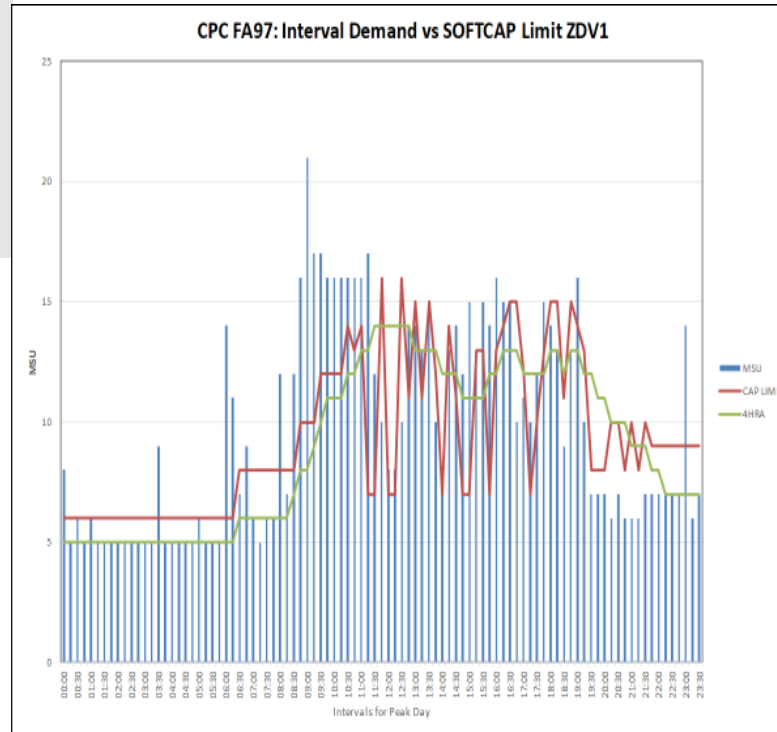


Max 4HRA=811 MSU - Importance 1 workload capped

With iCap



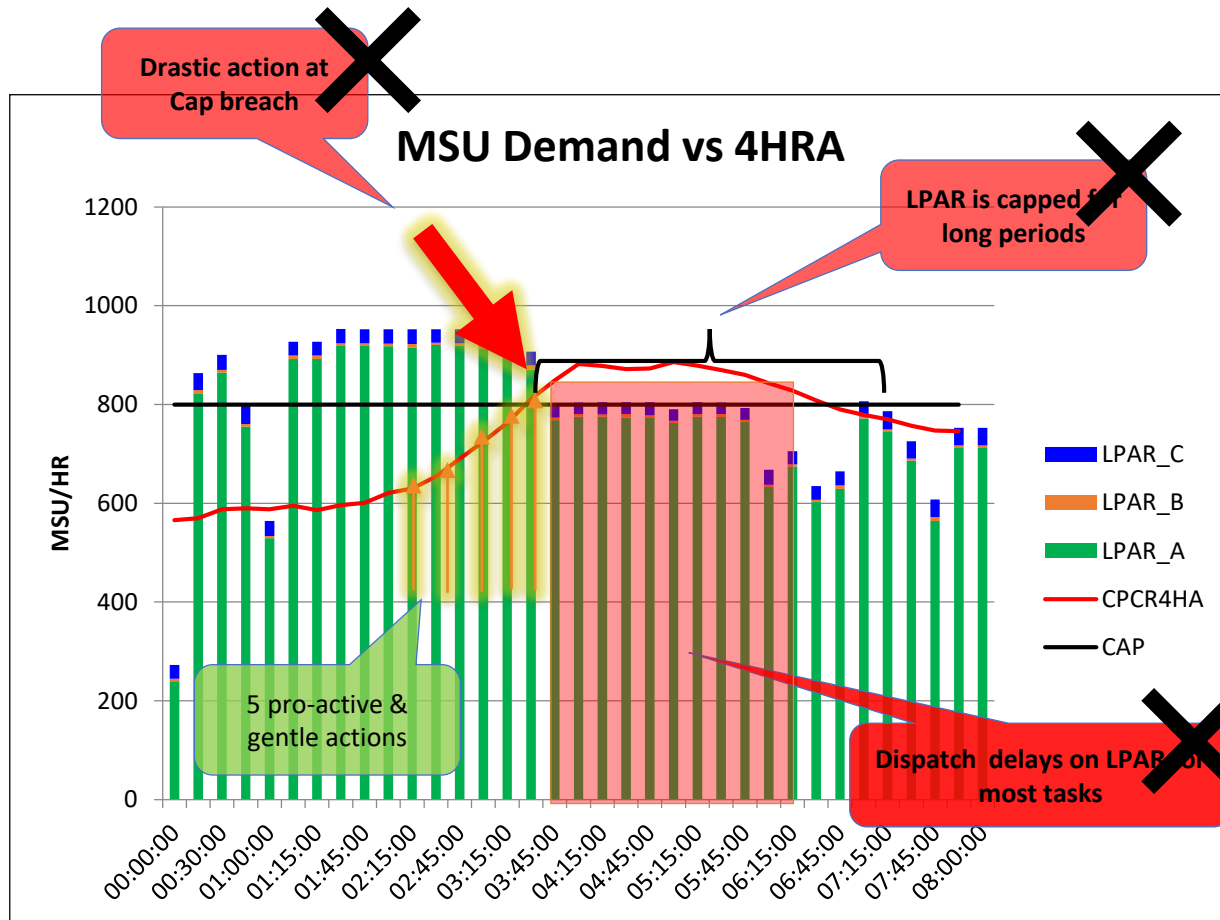
MSULIMIT=650 - Saving of 161 MSU - No high importance workload capped



ing down capacity:

Priority Aware

Why not avoid Capping?

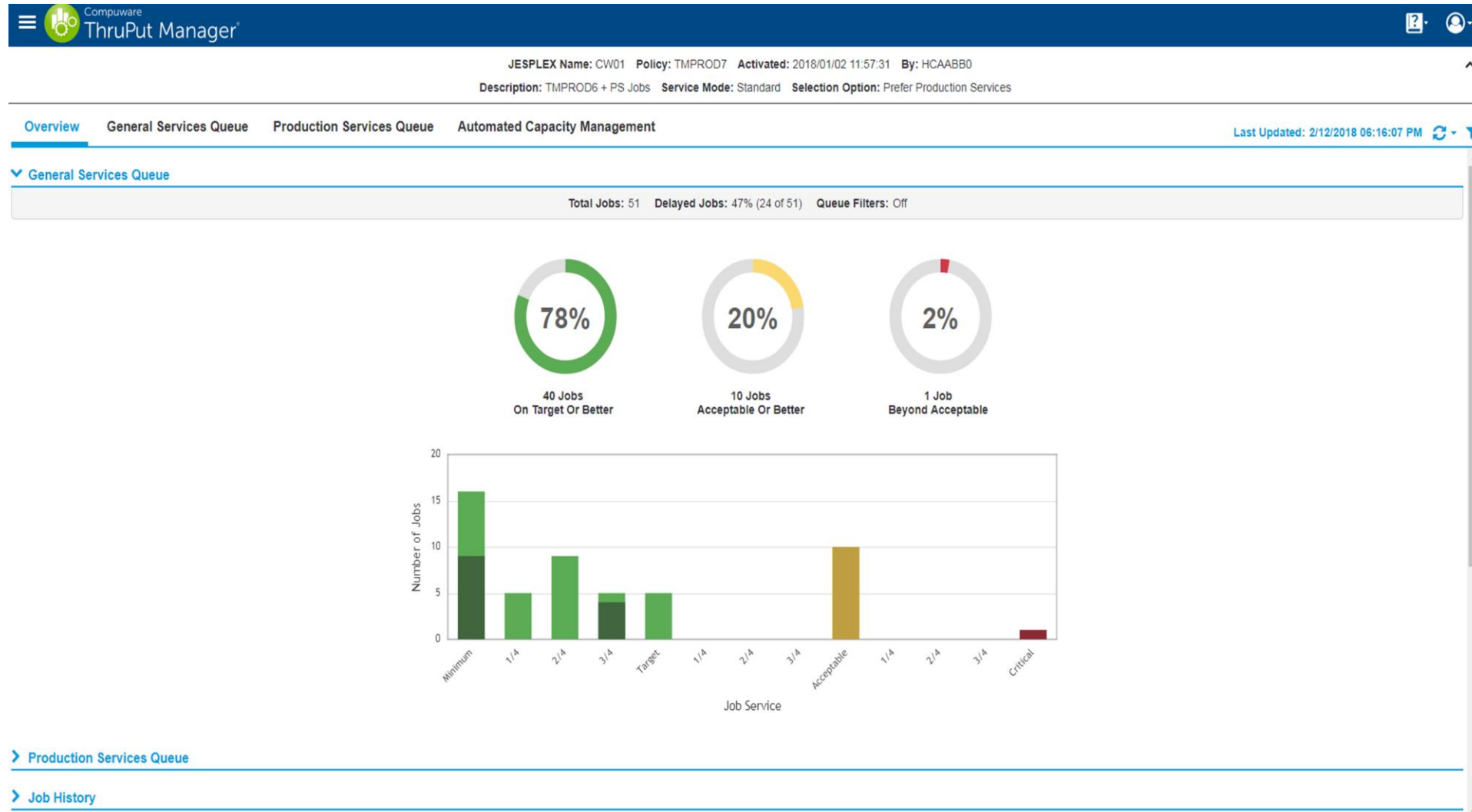


Capacity Level	Percentage of Target	4HRA trigger	ACM automated action
5	80%	800	Move low test batch to RG with 3 CP's max
4	85%	850	Limit low test to 10 jobs & all test batch to RG with 2 CP's max
3	90%	900	Move test and dev batch to RG with 2 CP's max
2	95%	950	Limit dev to 10 jobs & test and dev batch to RG with 1 CP max
1	99.9%	999	No test initiation & test, dev and low prod to RG with .5 CP max

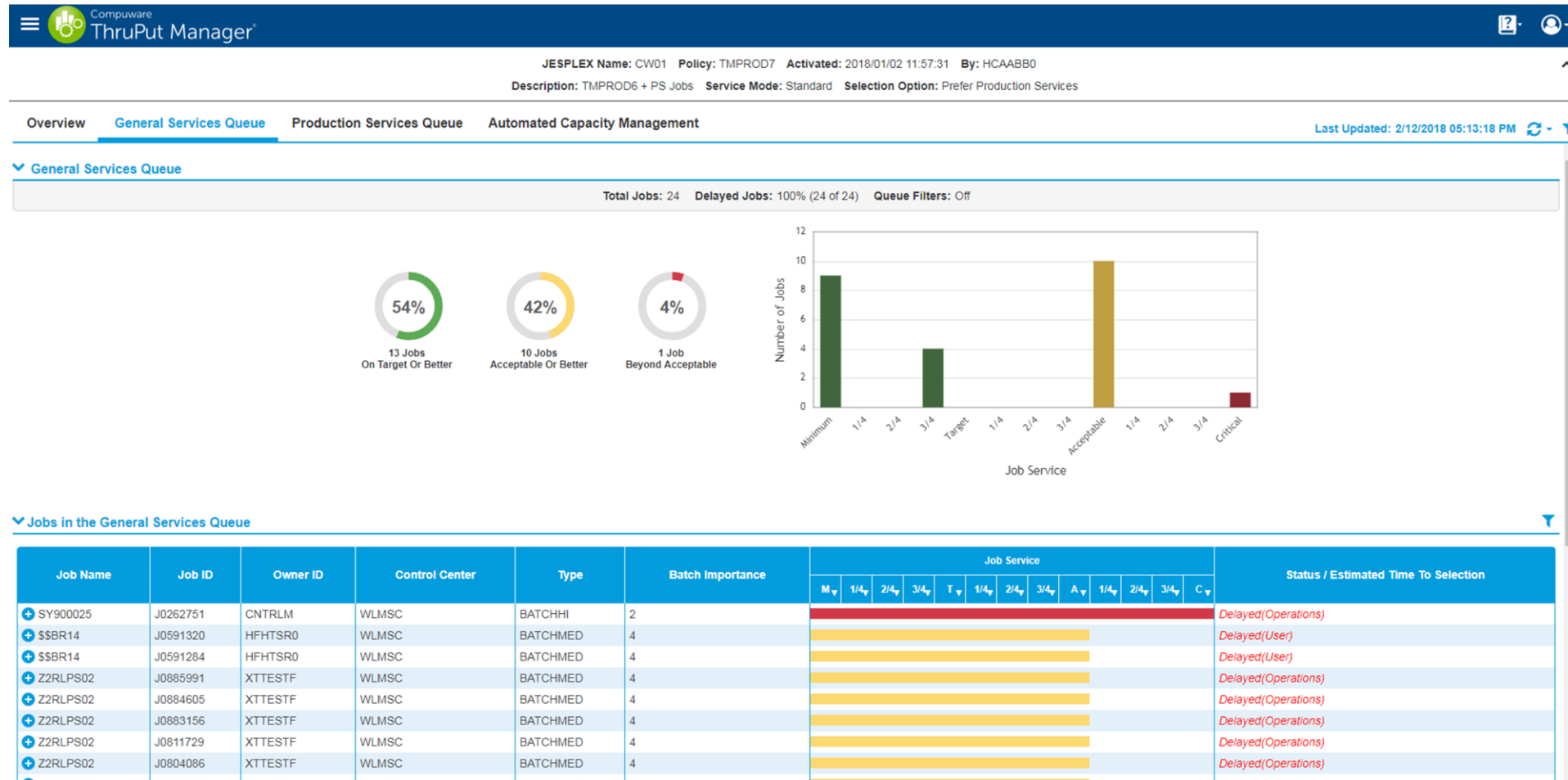
How do we know it's all working?

- A helicopter view would help...
- I have a dashboard for most of my vital Production services
- We'd love to re-sort our batch workload data to aid analysis
- Input queue service performance indication?
- Click-click technology to locate issues?
- An on-going history of R4HA and constraint levels?
- Some Job history metrics would be useful...

Overview Tab – General Services Queue



General Services Tab



Detailed Job Data

Compuware
ThruPut Manager
? | [User Icon]

JESPLEX Name: CW01 **Policy:** TMPROD7 **Activated:** 2018/01/02 11:57:31 **By:** HCAABB0
Description: TMPROD6 + PS Jobs **Service Mode:** Standard **Selection Option:** Prefer Production Services

Overview **General Services Queue** Production Services Queue Automated Capacity Management

Last Updated: 2/12/2018 05:25:30 PM

Job ID	Job Name	Control	WLMSC	Batch	Priority	Progress	Status
SY900025	J0262751	CNTRLM	WLMSC	BATCHHI	2	<div style="width: 100%; height: 10px; background-color: red;"></div>	Delayed(Operations)
SPHSCH0G	J0262983	SPHSCH0	WLMSC	CLASSJ	3	<div style="width: 10%; height: 10px; background-color: green;"></div>	Delayed(DCS)

DCS (Dataset Contention Services) - Job is HELD by ThruPut Manager

WAITING FOR 1 DATA SET
SYS1.LINKLIB NEEDED EXC STANDBY

SLM (Service Level Manager)

Awaiting Execution
At 17:25:36, job was not selected because it is held by ThruPut Manager
Control Center: WLMSC (WLM SERVICE CLASS MAPPING)
Type : CLASSJ (CLASS J)
Batch Service : Before Target
Trend : Stable
Service Mode : Standard
Importance : 3
Job Service : Before Target
Estimated Time to Selection: Indeterminate
Effective Queue Time : Less than 1 minute
Total Delay Time : Less than 1 minute
Currently Delayed By : DCS

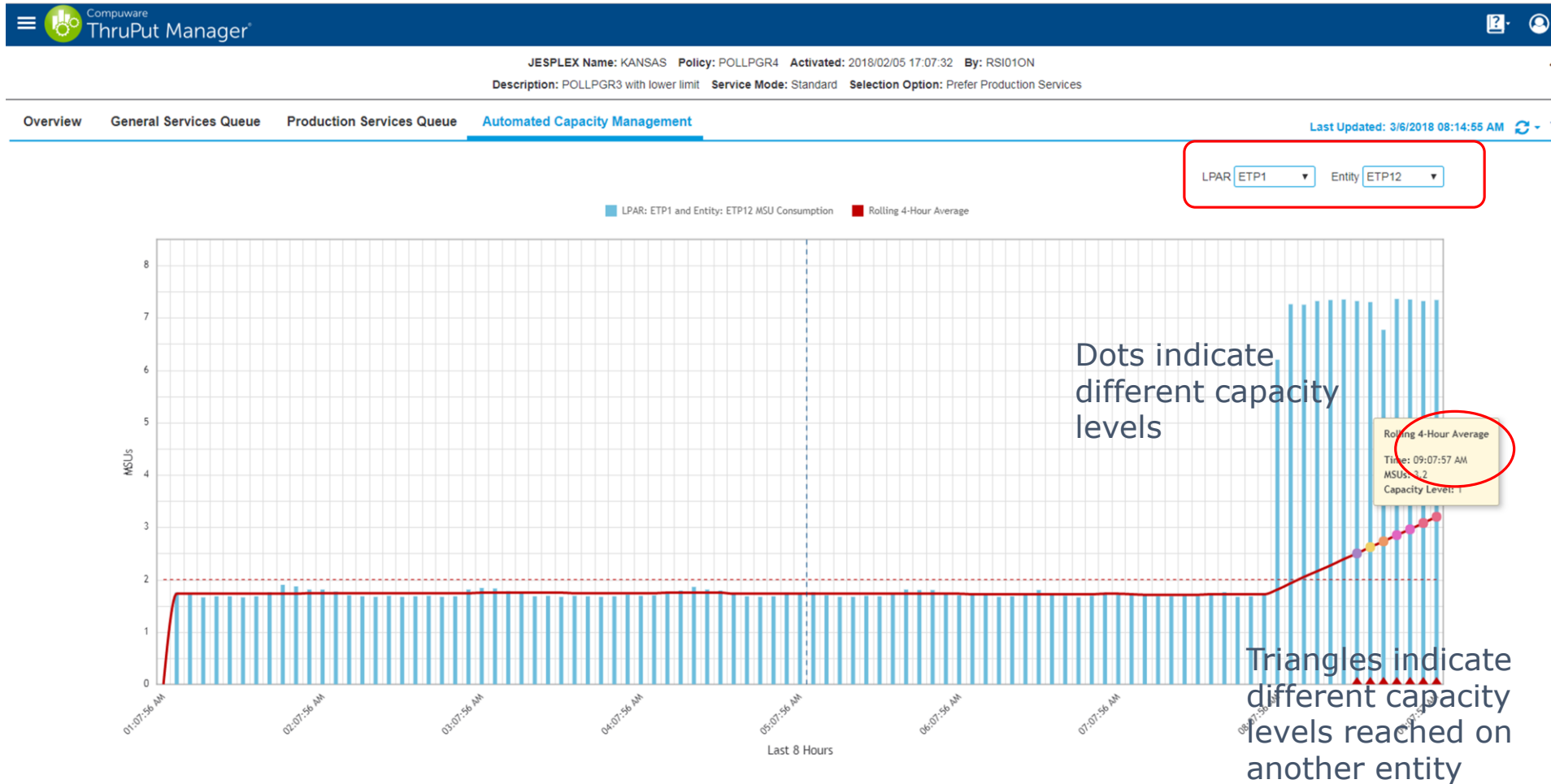
INFO (Information)

Awaiting Execution
At 17:25:36, job was not selected because it is held by ThruPut Manager

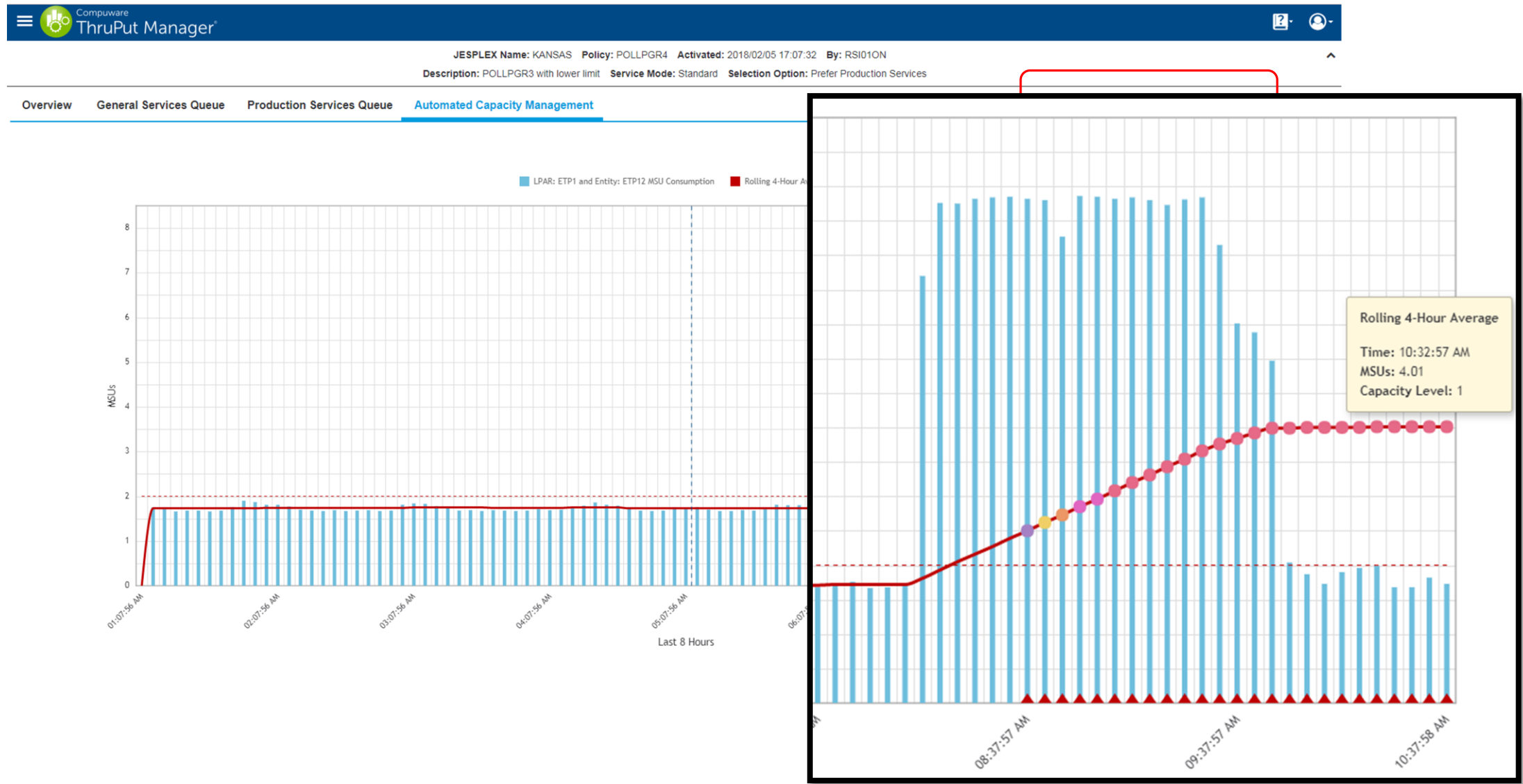
Submission Class	J	Assigned Class	7
Submission Priority	9	Assigned Priority	0
CPU Time	1439:00 mins	Region Size	6144K
Physical Tape Cartridges	0	Drives	0
Virtual Tape Volumes	0	Drives	0

IMSEHWSS	J0205389	IMSERDRS	WLMSC	LONGJOB	3	<div style="width: 100%; height: 10px; background-color: green;"></div>	Delayed(User)
IMSEHWSS	J0205299	IMSERDRS	WLMSC	LONGJOB	3	<div style="width: 100%; height: 10px; background-color: green;"></div>	Delayed(User)
H01AC623	J0165208	AMINAA0	WLMSC	CLASSJ	3	<div style="width: 10%; height: 10px; background-color: green;"></div>	Delayed(User)

Automated Capacity Management Tab



Automated Capacity Management Tab



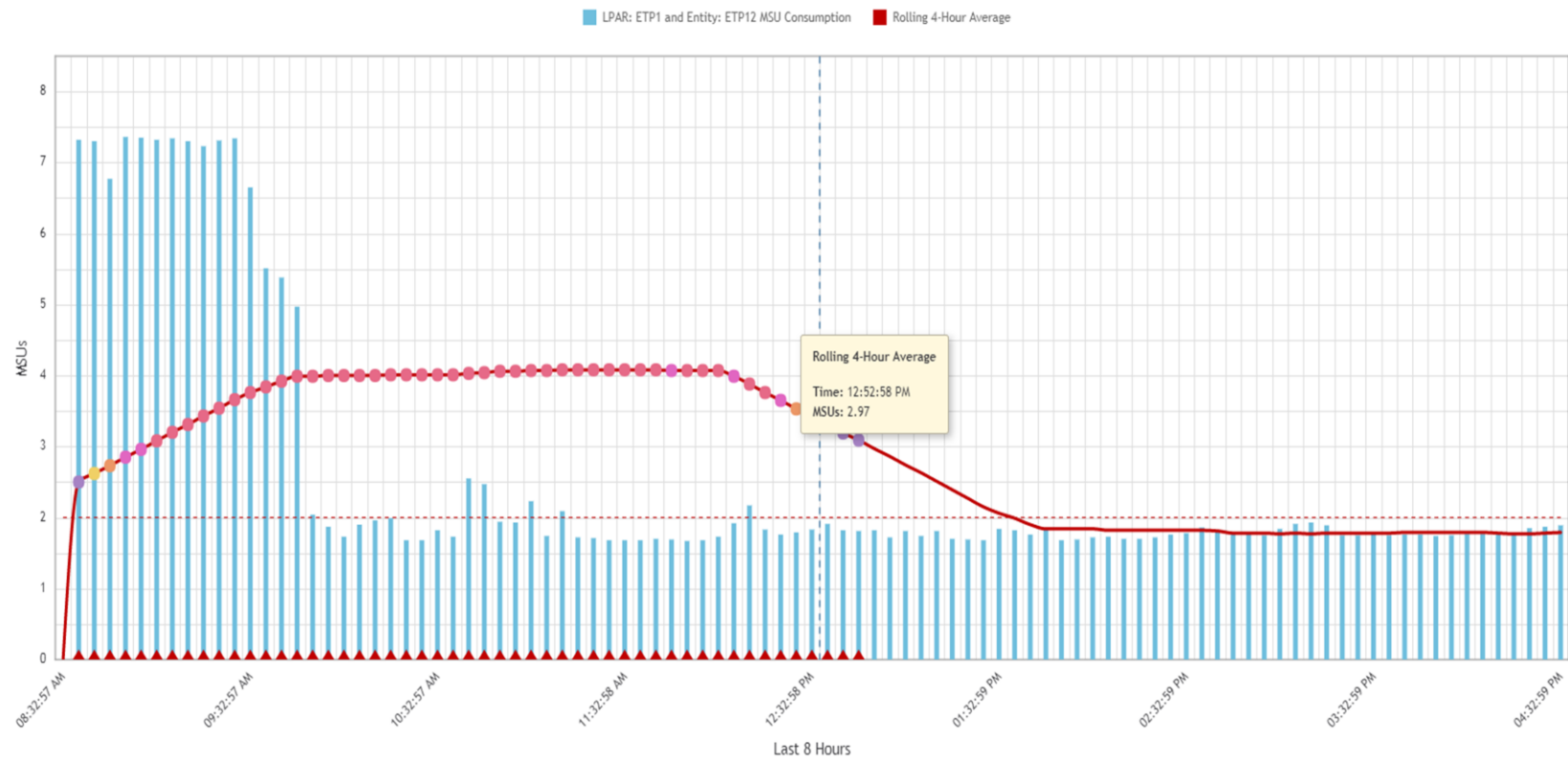
Automated Capacity Management Tab

Compuware ThruPut Manager

JESPLEX Name: KANSAS Policy: POLLPGR4 Activated: 2018/02/05 17:07:32 By: RSI010N
 Description: POLLPGR3 with lower limit Service Mode: Standard Selection Option: Prefer Production Services

Overview General Services Queue Production Services Queue **Automated Capacity Management** Last Updated: 3/6/2018 03:40:08 PM

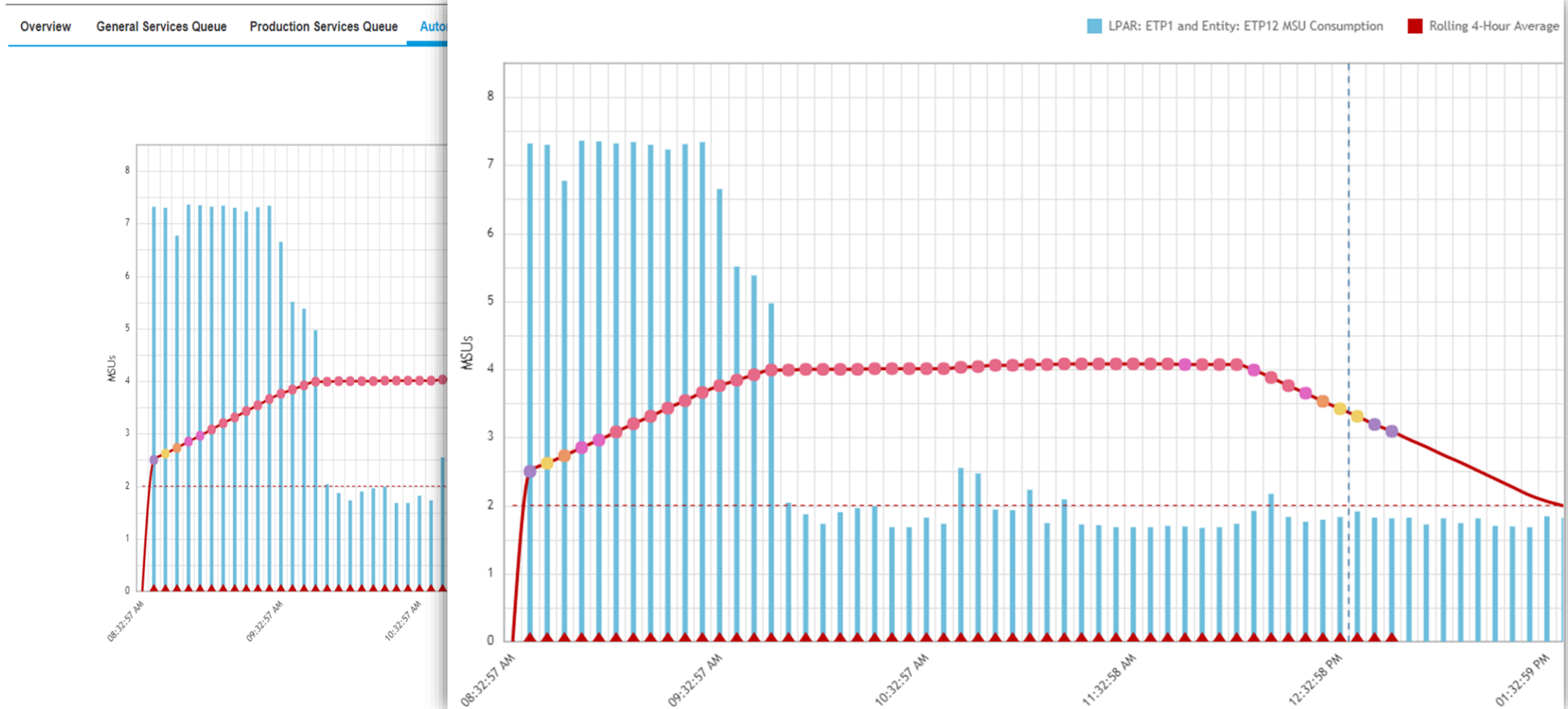
LPAR: ETP1 Entity: ETP12



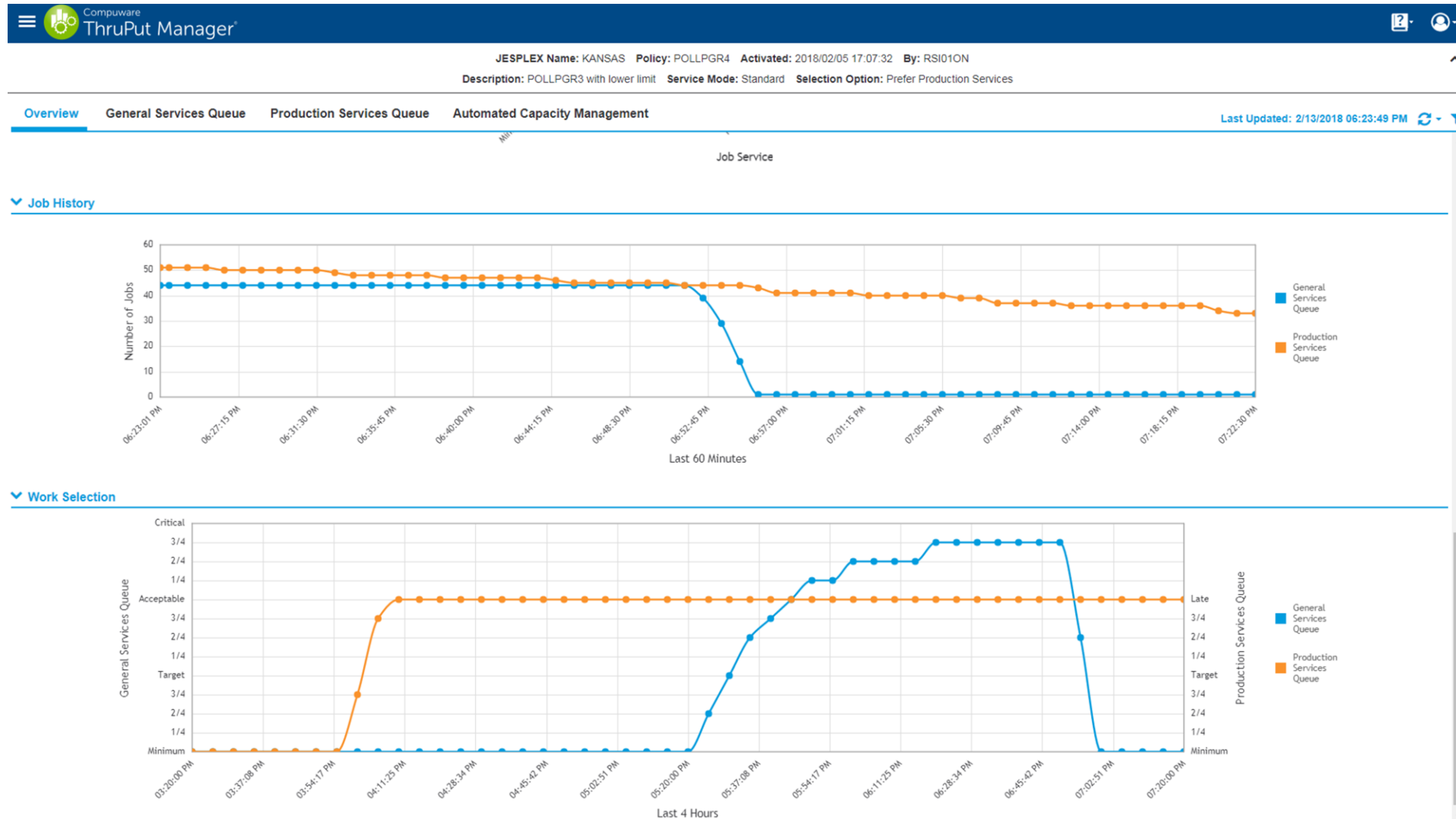
Automated Capacity Management Tab

JESPLEX Name: KANSAS Policy: POLLPGR4 Activated: 2018/02/05 17:07:32 By: RSI010N

Description: POLLPGR3 with lower limit Service Mode: Standard Selection Option: Prefer Production Services



Job History and Work Selection



Why modernise your Batch environment?



VS



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the border and
text beforehand.