



# **Mainframe IT Operational Analytics in BPCE-IT Examples**



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# Who is BPCE ?



## Second Bank Group in France

 **9** millions  
corporate members

 **31,2** millions  
customers



 **108 000**  
contributors



 **8 000**  
banking agencies

Présent  
in **48** countries 

 **20 %**  
of french economy financing

# BPCE-IT Mainframe Technical Environment

Topaze	
S1	<p><b>z14 737</b> <b>43.338 MIPS LSPR – 5.081 MSU</b></p>  <p><b>37 GCP</b> <b>8 zIIP</b></p>
S3	<p><b>z14 401</b> <b>256 MIPS LSPR – 32 MSU</b></p>  <p><b>16 ICF</b> <b>5 IFL</b></p>

Saphir	
S2	<p><b>z14 736</b> <b>42.340 MIPS LSPR - 4.963 MSU</b></p>  <p><b>36 GCP</b> <b>8 zIIP</b></p>
S4	<p><b>z14 401</b> <b>256 MIPS LSPR - 32 MSU</b></p>  <p><b>16 ICF</b> <b>5 IFL</b></p>

# Examples of some TDSz application in BPCE-IT Mainframe IT Operationnal Analytics

- **Statistical Exception Detection**
  - **CICS Monitoring**
  - **CICS Predictive Analysis**
    - **Capacity Planning z**
    - **SCRT Peak Analysis**
    - ...

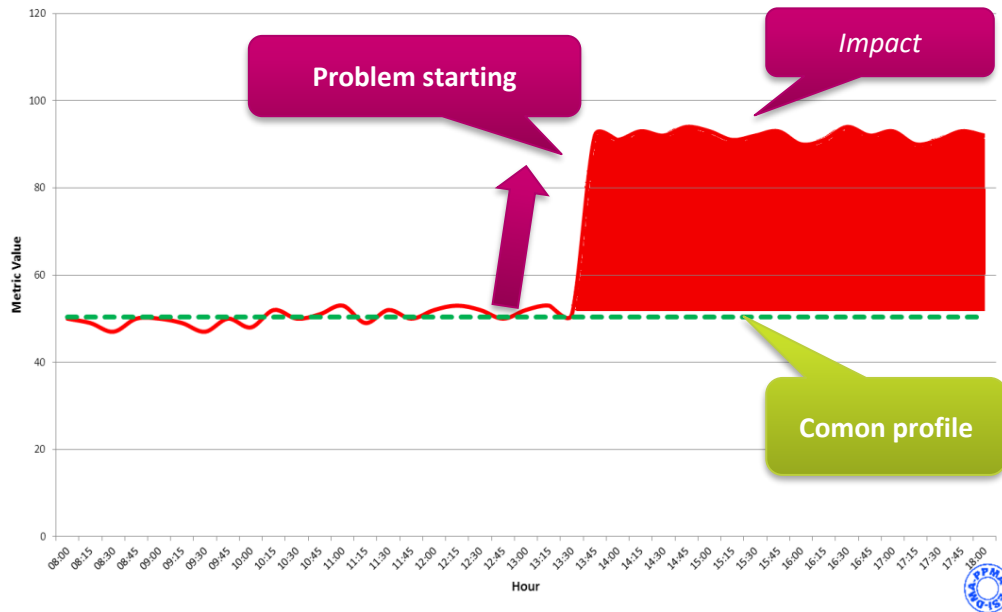
# Statistical Exception Detection



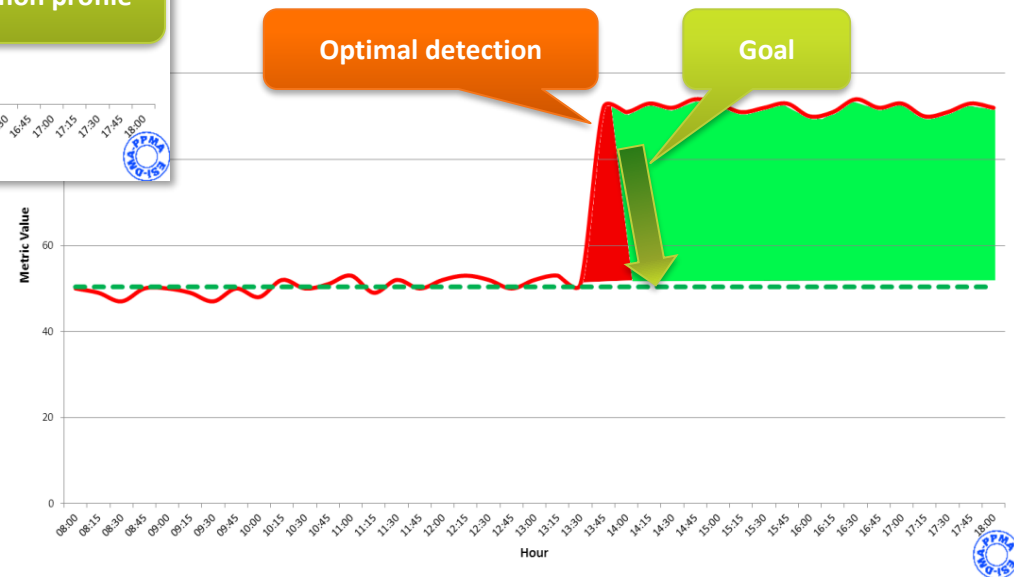
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# The Problem & Our Goal

**CPU Consumption by Hour**  
Lpar MVS3 - Workload TSO - Day of Week Tuesday



**CPU Consumption by Hour**  
Lpar MVS3 - Workload TSO - Day of Week Tuesday





**1** Exception Detection

**B** Collect & Analyse

**2** eMail Alert sending

**A** Statistical Model establishment

**3** Exception characterization

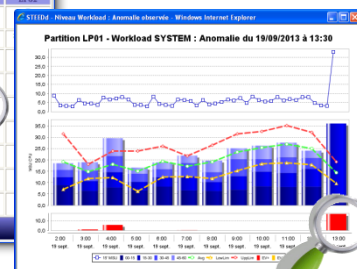
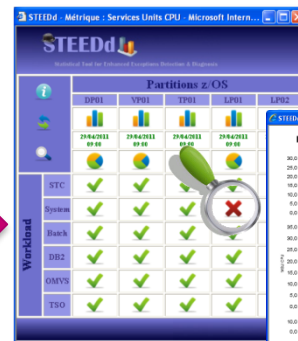
**4** Adjustment for correction



STEEDd Exit

STEEDd Program

Statistical Model



De : [redacted]  
Envoyé : jeudi 19 septembre 2013 13:32  
A : [redacted]  
Objet : STEEDd - Mail LP01 Wldd SYSTEM : SurConsommation CPU

STEEDd : SurConsommation CPU Services Units

Mvld	LP01
Workload	SYSTEM
Interval	19/09/2013 13:32
Lower Control Limit (LCL)	9 589 271
Center Line (CL)	14 383 906
Upper Control Limit (UCL)	19 178 542
CPU SU Consumed	36 143 893
Delta with UCL	+16 965 351

```
DB1 JCPU-----LP01-----19SEP2013 13:42:15N+NNVVS+D
C Jobname Interval Intvl JES Job SrvClass Interval All CPU Sec
DCL1 19SEP2013 12:00 150000 SVSSTC 0.....30.....60
DCL1 19SEP2013 12:15 150000 SVSSTC 18.49
DCL1 19SEP2013 12:30 150000 SVSSTC 11.03
DCL1 19SEP2013 12:45 150000 SVSSTC 8.19
DCL1 19SEP2013 13:00 150000 SVSSTC 5.49
DCL1 19SEP2013 13:15 150000 SVSSTC 3.49
DCL1 19SEP2013 13:30 150000 SVSSTC 2.49
DCL1 19SEP2013 13:45 150000 SVSSTC 1.49
DCL1 19SEP2013 14:00 150000 SVSSTC 0.49
```





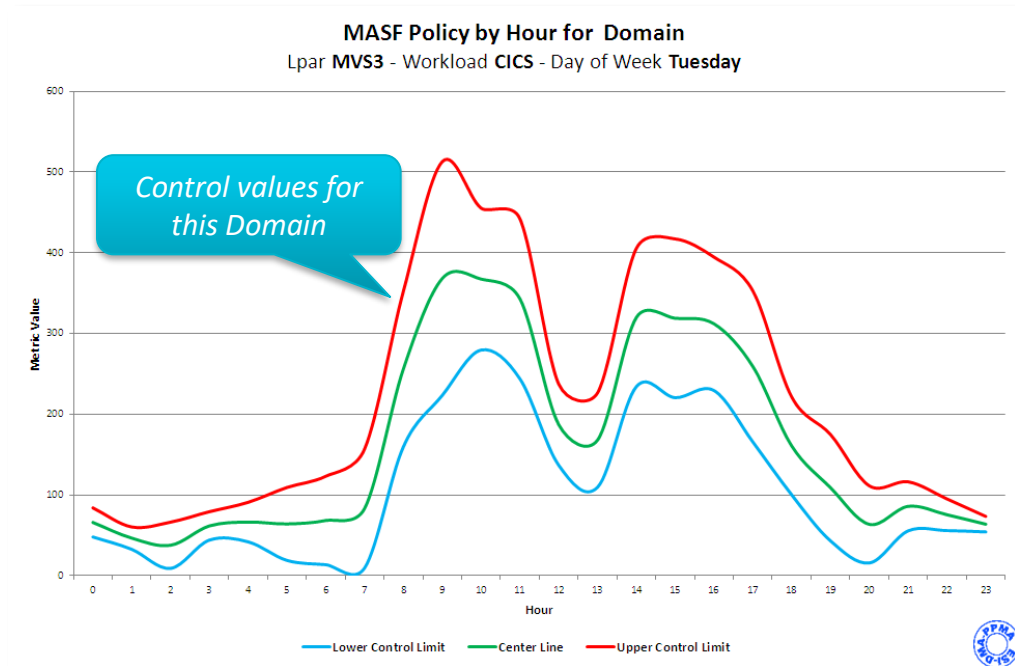
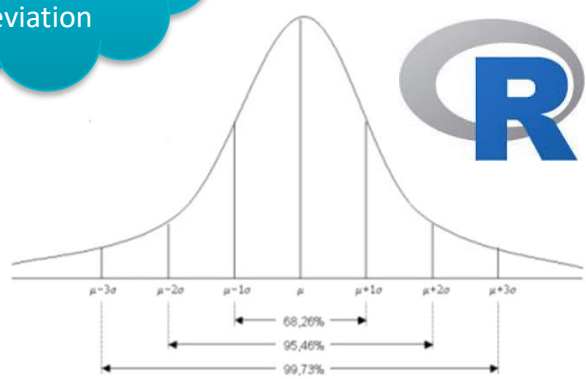
STEED :

A

## Statistical Model establishment

- Analyse of **TDSz** historical datas (6 months of available datas) with the following method :
  - Aggregation** of the reference historical datas by retained Domains
    - Example : Week day, Hour, Lpar, Workload
  - Statistical filtering** by Domain, to exclude past outliers from calculation
  - Statistical Model establishment** with control values calculation for each Domain
    - LCL** (« Lower Control Limit ») =  $\mu - 3\sigma$
    - CL** (« Center Line ») =  $\mu$
    - UCL** (« Upper Control Limit ») =  $\mu + 3\sigma$

$\mu$  : Arithmetic  
Average  
 $\sigma$  : Standard  
Deviation

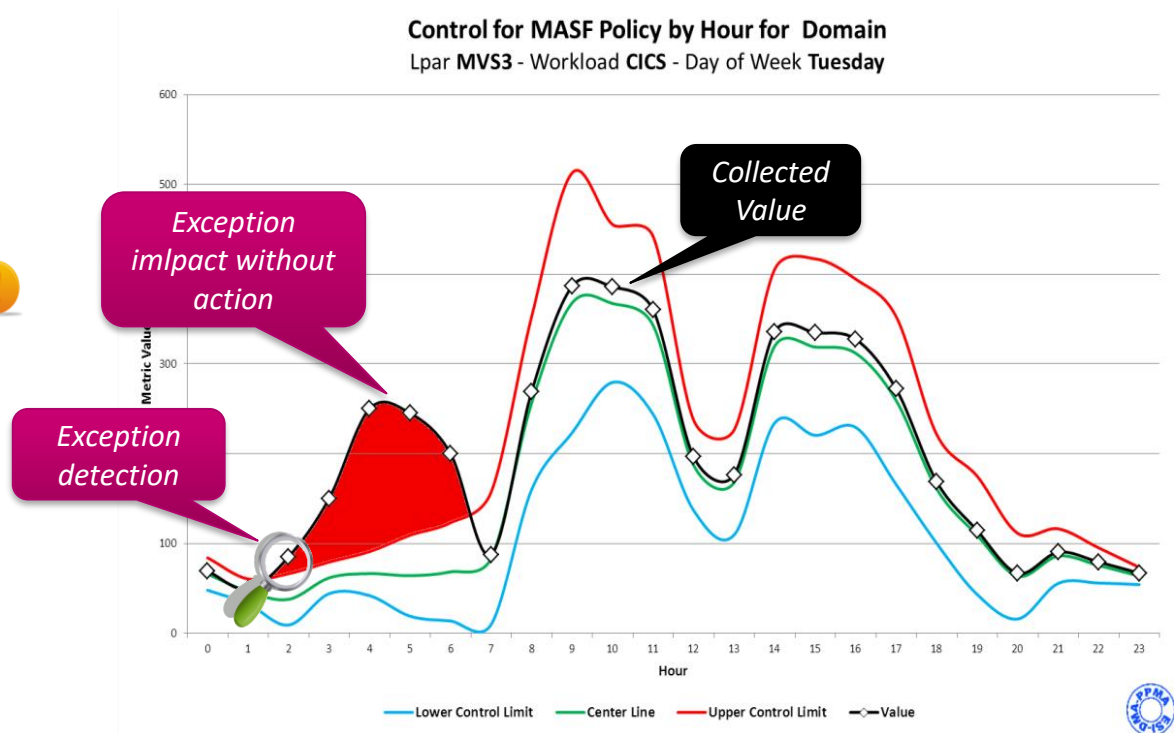






# STEEDd : B Data Collect & Analysis

- For each retained Domain, analyse with a « Near-Real Time » Exit with the following method :
  - Collect of the last interval of time value
  - Use of control chart to compare the collected value with the corresponding control values, as defined in the reference Statistical Model
    - If **Collected Value** > **UCL** or **Collected Value** < **LCL** then **Exception Detection**
- If **Exception Detection** then :
  - Exception's Impact evaluation
  - Alert eMail sending
  - Domain State evolution

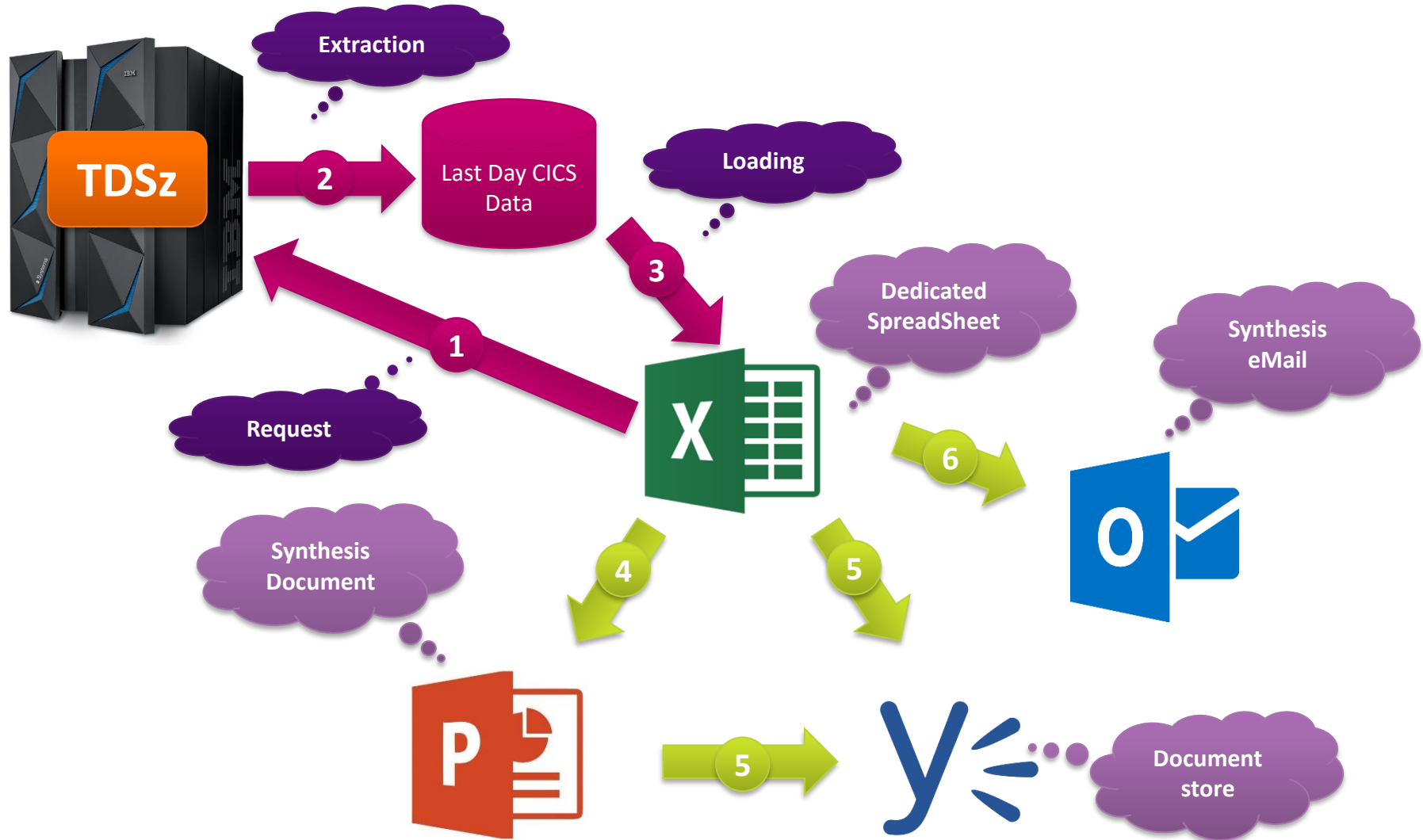


# CICS Monitoring

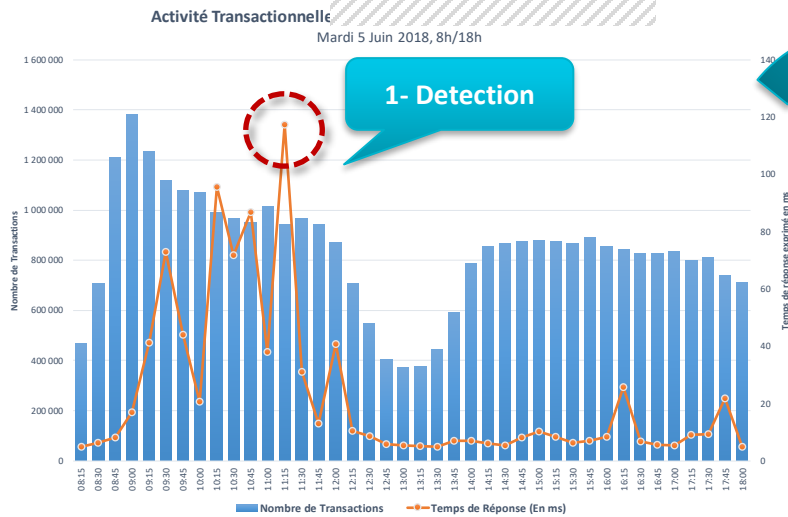


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# CICS Monitoring



# CICS Monitoring - Example



2- Consolidation

**Synthèse Qualité de Service CICS**  
Mardi 5 Juin 2018, 8h/18h

Catégorie	Transaction de référence	Seuil QoS en ms	Instance	08:15	08:30	08:45	09:00	09:15	09:30	09:45	10:00	10:15	10:30	10:45	11:00	11:15	11:30	11:45	12:00	12:15	12:30	12:45	13:00	13:15	13:30	13:45	14:00	14:15	14:30	14:45	15:00	15:15	15:30	15:45	16:00	16:15	16:30	16:45	17:00	17:15	17:30	17:45	18:00	QoS		
Banque à Distance		200	IP1																																										100%	
			IP2																																										100%	
			IP3																																										100%	
Poste de Travail		400	IP1																																											100%
			IP2																																										100%	
			IP3																																										100%	

**Synthèse Qualité de Service CICS**  
Mardi 5 Juin 2018, 8h/18h

4- Publication

	Instance	QoS
		100%
		100%
		100%
	Partition	QoS
		100%
		100%
		100%
		98%
		100%

Partition			Seuil QoS en ms	08:15	08:30	08:45	09:00	09:15	09:30	09:45	10:00	10:15	10:30	10:45	11:00	11:15	11:30	11:45	12:00	12:15	12:30	12:45	13:00	13:15	13:30	13:45	14:00	14:15	14:30	14:45	15:00	15:15	15:30	15:45	16:00	16:15	16:30	16:45	17:00	17:15	17:30	17:45	18:00	QoS	
			100																																										100%
			100																																										100%
			100																																										100%
			100																																										98%
			100																																										100%

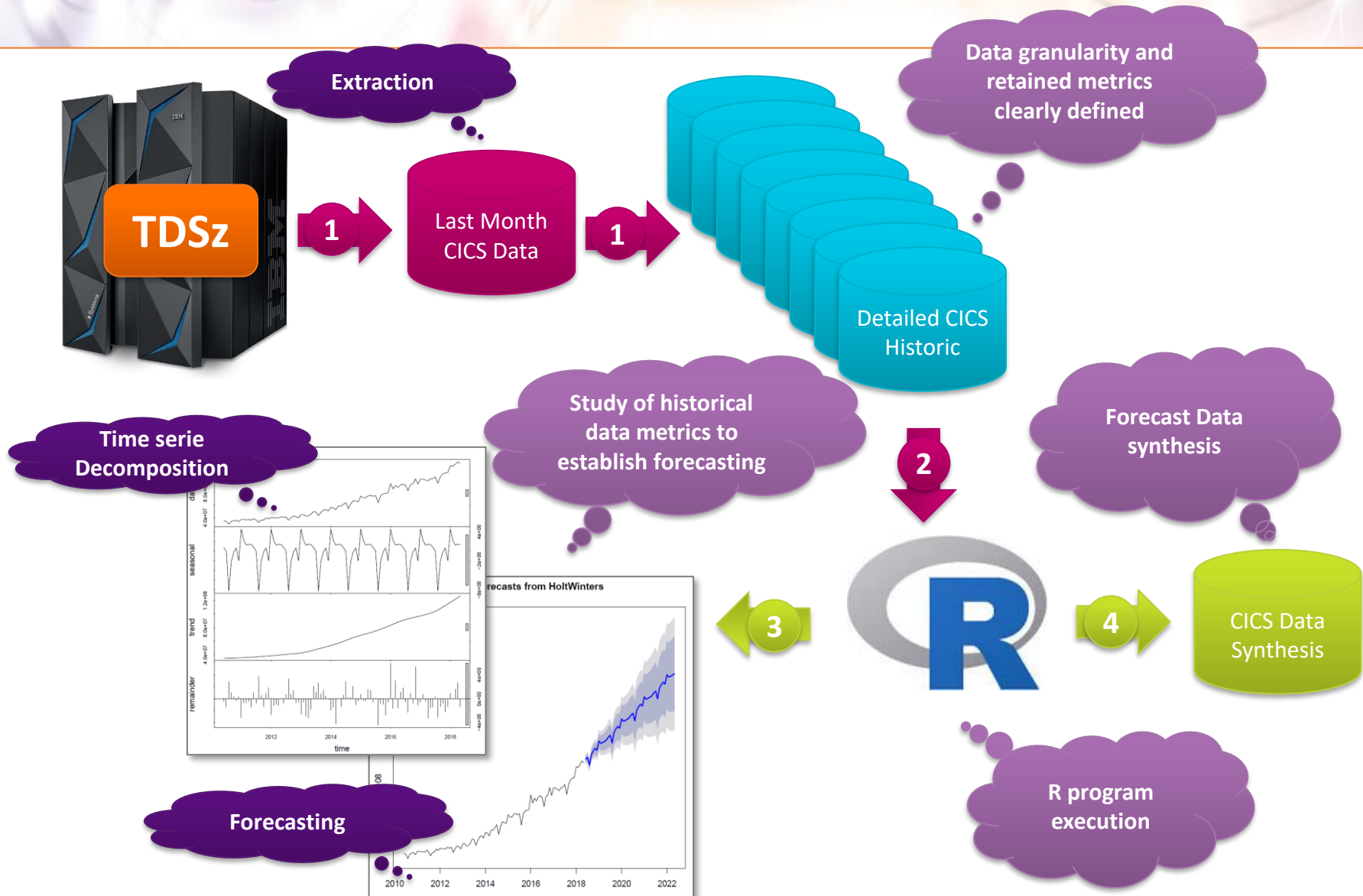
3- Synthesis

# CICS Predictive Analysis



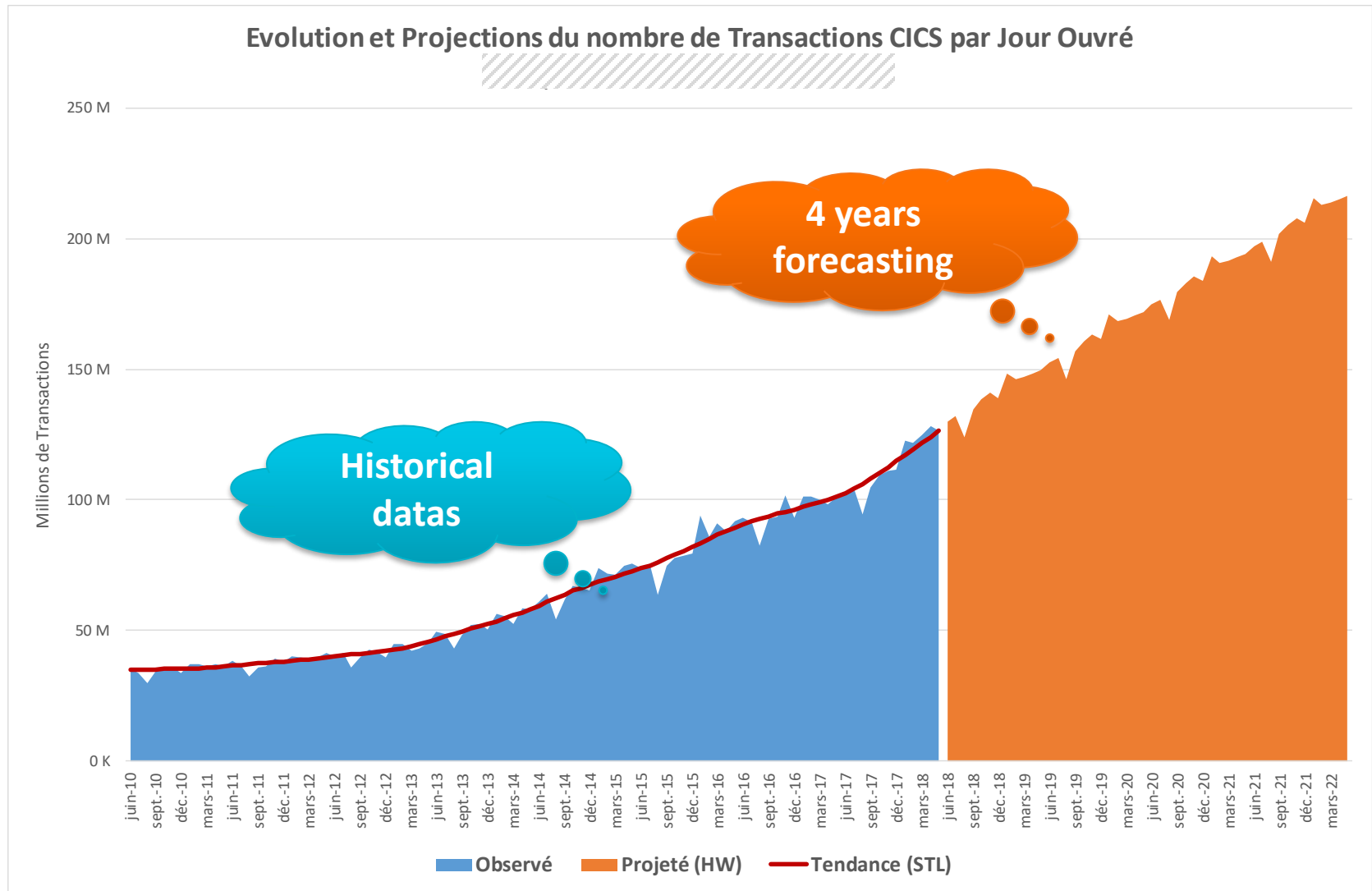
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# CICS Predictive Analysis





# CICS Transactional Activity Forecasting – Example





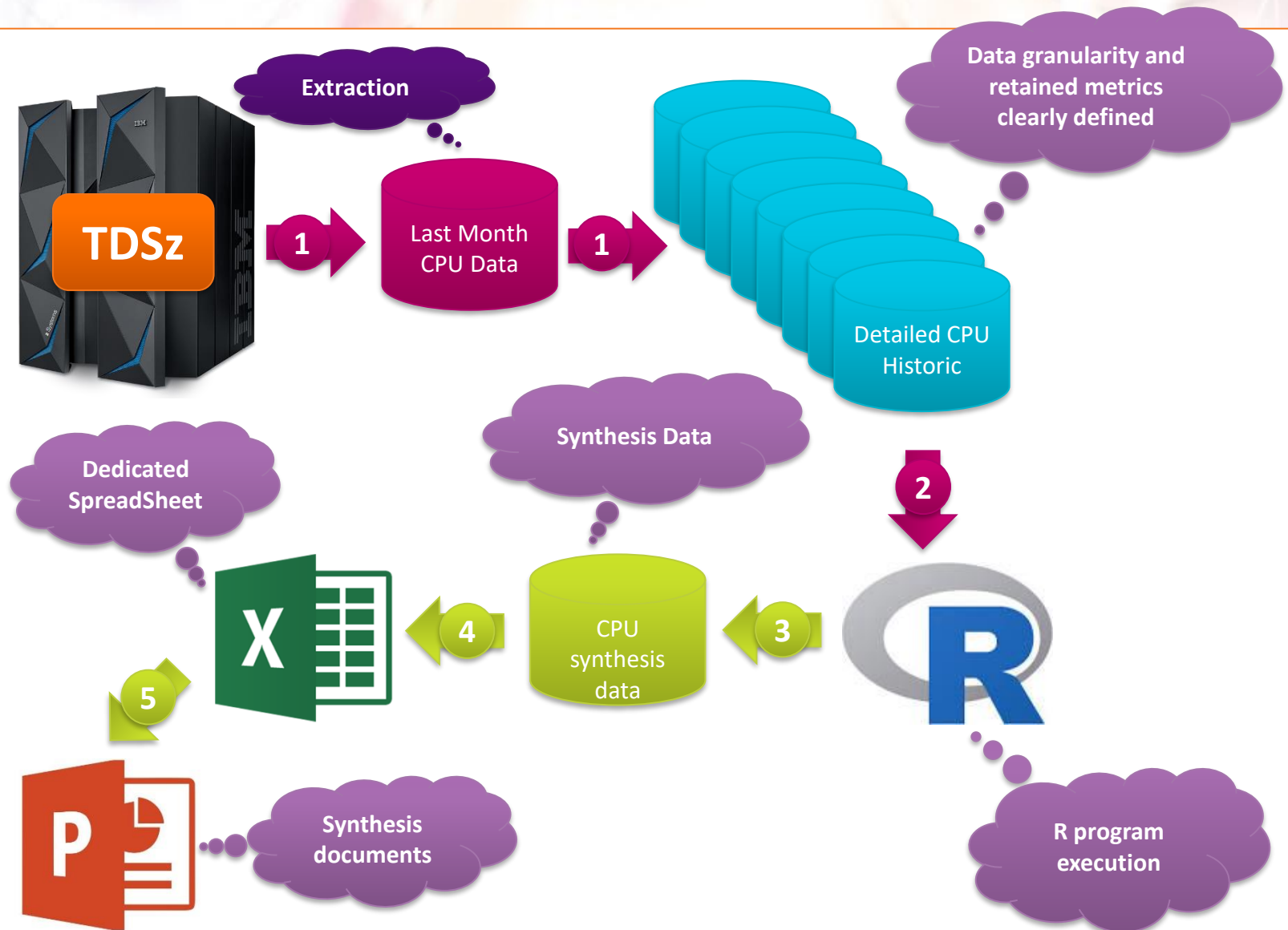
# Capacity Planning z



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# Capacity Planning z

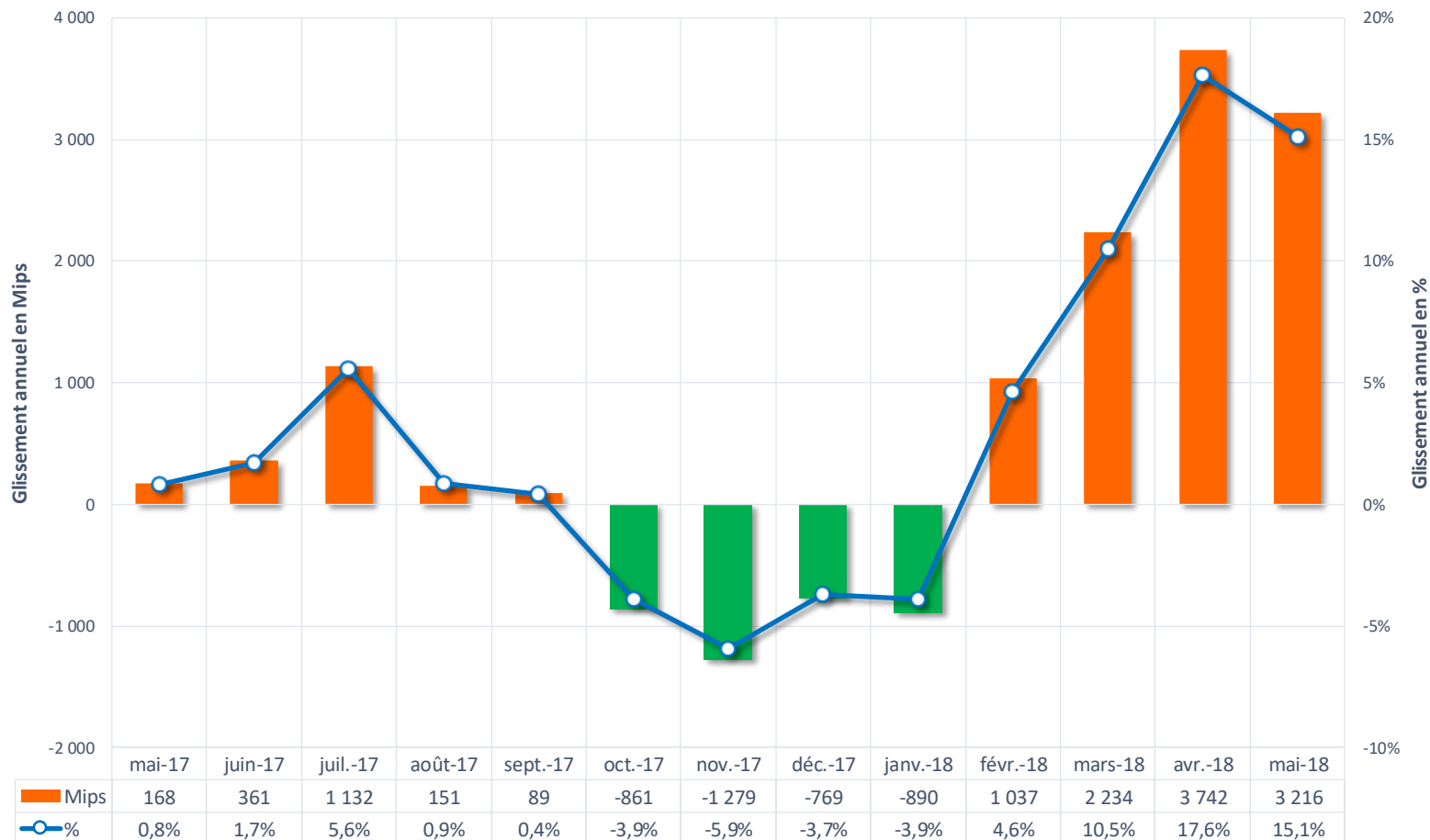


# Results - Examples

MIPS consumption on open day at 10 o'clock in the morning  
→ Annual growth for a group of LPAR

## Evolution de la consommation CPU moyenne des Partition

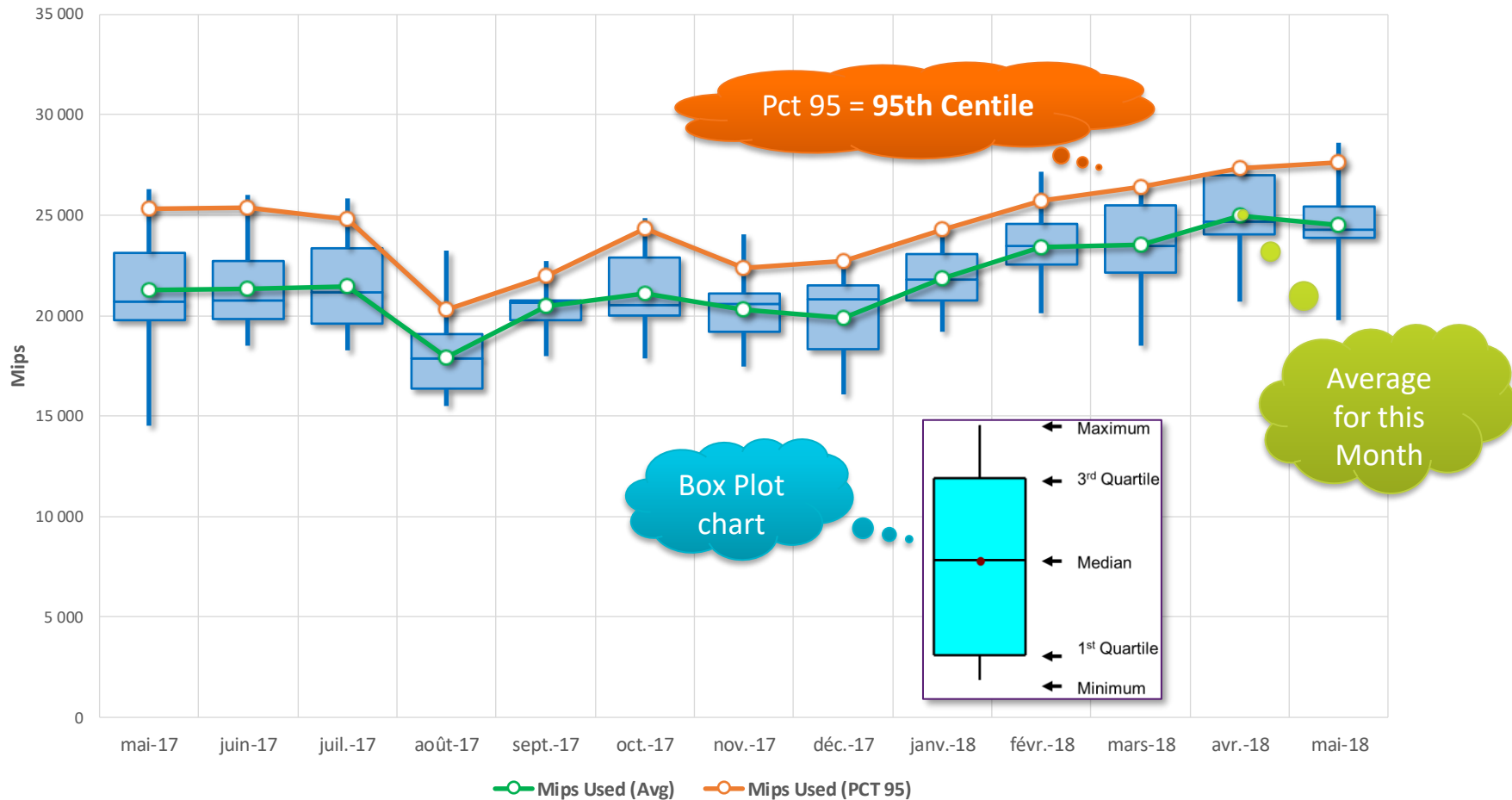
Mardi au Vendredi - Jours Ouvrés - 10h - Glissement Annuel



# Results - Examples

MIPS consumption on open day at 10 o'clock in the morning  
→ Monthly profile & growth for a group of LPAR

Evolution de la consommation CPU moyenne des Partition  
Mardi au Vendredi - Jours Ouvrés - 10h - Evolution Mensuelle

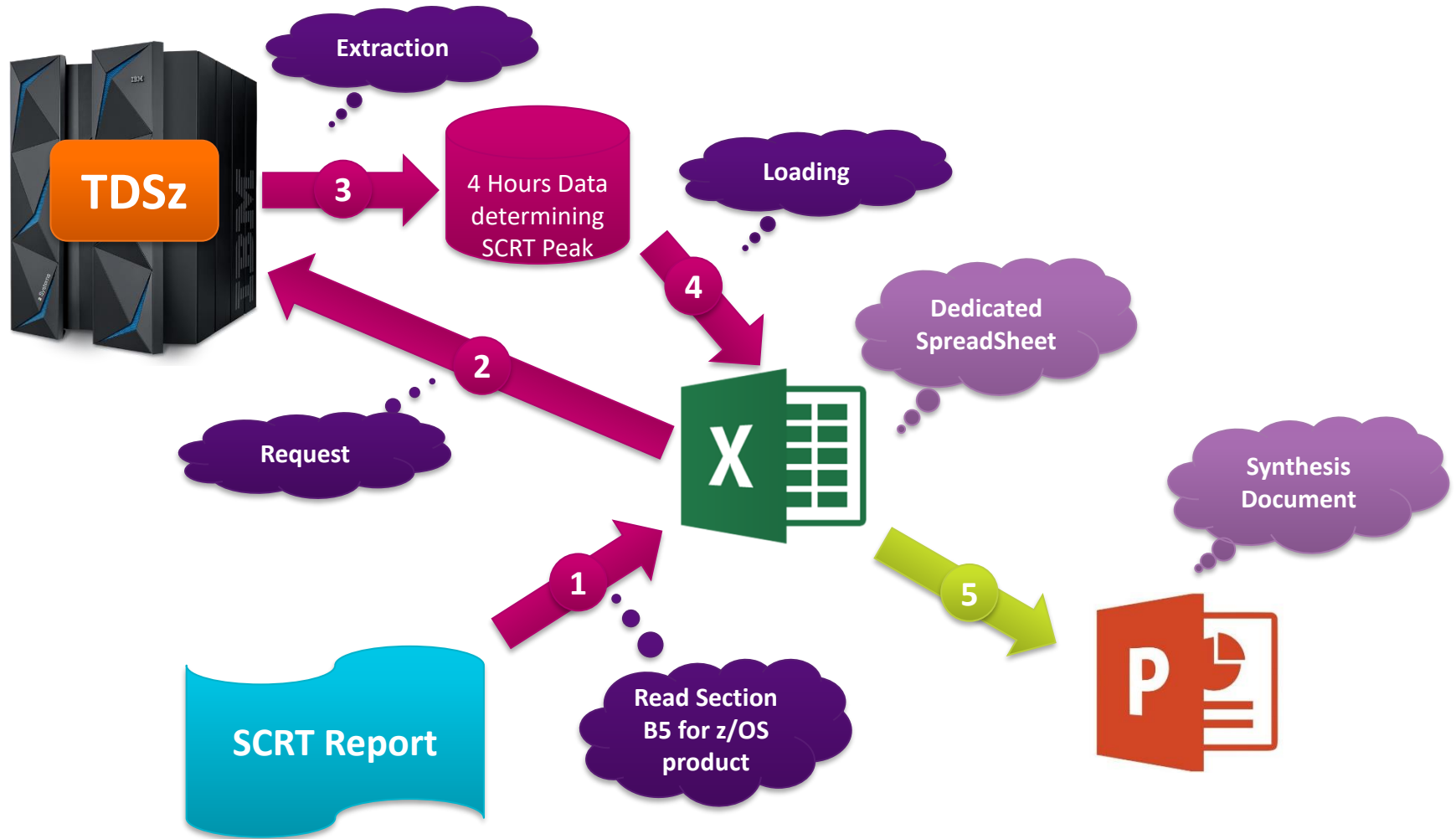


# SCRT Peak Analysis



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# SCRT Peak Analysis



# SCRT Peak Analysis - Example

Top 10 des Pointes de consommation SCRT pour le produit z/OS

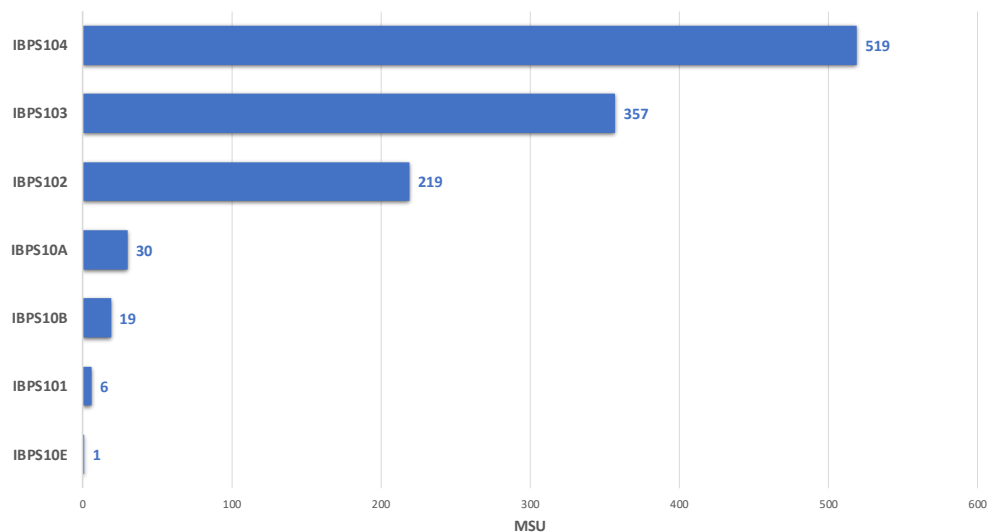
Serveur // // // // // // // // // //



Valeurs SCRT pour les partitions de la pointe du produit z/OS

Serveur // // // // // // // // // //

mardi 1 août 2017 1:00





# Top 20 Adress Spaces consumers of GCP MSU during the SCRT determining 4 Hours - Example

Traitement	Workload															Total	
		MSU	%	MSU	%	MSU	%	MSU	%	MSU	%	MSU	%	MSU	%	MSU	%
\$*FCLM70	BATCH	26	2,2%	18	1,5%	6	0,5%									50	4,2%
\$*WEBM30	BATCH	25	2,1%	9	0,7%	6	0,5%									39	3,3%
\$*OPBJA0	BATCH	23	2,0%	8	0,7%	7	0,6%									39	3,3%
\$*EXCJP1	BATCH	11	0,9%	8	0,7%	2	0,2%									21	1,7%
\$*OMPROJ	BATCH	7	0,6%	6	0,5%	6	0,5%									19	1,6%
\$*GPRM23	BATCH	4	0,3%	2	0,2%	2	0,1%	9	0,8%							17	1,4%
\$*CLTH6N	BATCH	7	0,6%	6	0,5%	3	0,3%									16	1,4%
\$*CLTH6L	BATCH	6	0,5%	5	0,5%	3	0,2%									14	1,2%
\$*CLTH5N	BATCH	8	0,6%	4	0,3%	2	0,1%									13	1,1%
\$*FCLM10	BATCH	6	0,5%	4	0,3%	2	0,2%									12	1,0%
CICSBN	STC	11	1,0%													11	1,0%
\$*CLTH6K	BATCH	5	0,4%	5	0,4%	2	0,1%									11	0,9%
\$*ACQJG4	BATCH	5	0,5%	2	0,2%	2	0,1%									10	0,8%
CATALOG	SYSTEM	3	0,3%	3	0,3%	2	0,2%	1	0,1%	0	0,0%	0	0,0%	0	0,0%	9	0,8%
\$*OPBR14	BATCH	4	0,3%	4	0,3%	2	0,1%									9	0,8%
CICSBN	STC	8	0,7%													8	0,7%
\$*EDHJ10	BATCH	5	0,4%	2	0,1%	1	0,1%									8	0,7%
\$*GPRM12	BATCH	5	0,4%	1	0,1%	2	0,2%									8	0,6%
\$*ITRR54	BATCH	3	0,2%	3	0,3%	2	0,2%									7	0,6%
DSPMSTR	STC	4	0,3%	3	0,2%	1	0,1%									7	0,6%
Total sélection		176	14,7%	91	7,7%	51	4,3%	10	0,8%	0	0,0%	0	0,0%	0	0,0%	329	27,6%
Total général		527	44,2%	372	31,2%	222	18,6%	48	4,1%	18	1,5%	4	0,3%	1	0,1%	1 192	100,0%

These 6 Adress Spaces represents 15,5% of the GCP MSU consumption during the determining 4 Hours

These 20 Adress Spaces represents 27,6% of the GCP MSU consumption during the 4determining 4 Hours



# **GROUPE BPCE**

Coopératifs, banquiers et assureurs autrement.