



IBM IDC Brno

# IS/IT outsourcing services – part 3

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# Agenda

- **Selected topics in IT**
- **Heterogeneous environments and remote administration**

# Agenda

- **Selected topics in IT**
  - Backup and data restore
  - RAID
  - UPS and backup power
  - Cluster
  - NAS
  - SAN
  - Auditing
  - Categorization of computers
  - Transactions
  - Batch file lives

## Backup and data restore

- **Requirements**
  - Backups must be protected from missuse
  - Errors resistance during backup / recovery process
  - D / R plan
  - Controlled data recovery
  - Organization of stored data
  - On-line backup of databases (SAP, DB2, ORACLE)
  - Error Report
- **BACK-UP SW producers**
  - HP, SUN, IBM, Legato, Veritas, CA

## Backup and data restore

- **Full backup**
  - Resource-intensive
  - Easy recovery
- **Differential backup**
  - Backup from only the last full backup
  - With the growing number of backups the time of backup grows
  - To restore you need a full backup and last differential
- **Incremental backup**
  - Backup data from only the last backup (any)
  - Fast and small volumes of data
  - To restore you need full backup and all incremental backups.

## Backup and data restor

- **Backup to disk media**

- To tens of TB
- High data availability



- **Backup to tape media**

- Supported by disc media that emulate tape media
- Thousands tapes
- Thousands of TB (eg 5616TB for IBM 3494)
- Up to hundreds of readers
- Several TB of disk space
- Best facilities operated by robot



## RAID

- **Redundant Array of Independent Disks**
- **Striping**
  - Data are divided into small pieces and placed evenly across the partitions (increases speed of access)
- **Mirroring**
  - Data are stored on two identical disks
- **Parity**
  - Parity data on the stored data will increase the chance of recovery.

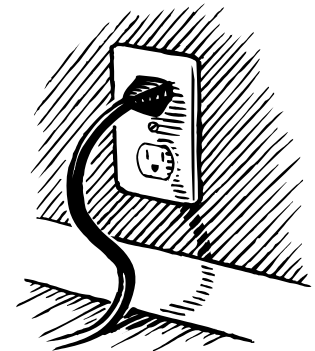
# RAID

- **RAID 0**
  - It uses ordinary stripping.
  - High speed writing and reading data
  - Does not reduce the total amount of disk space
  - No data protection
- **RAID1**
  - Uses mirroring.
  - Very reliable
  - Half of the volume space
  - High speed reading (both drives work simultaneously)
- **RAIDs, 2, 3 and 4**
  - Using parity.
  - Dedicated disks for parity data
  - High occupancy data disks with adjustment limits system performance.
- **RAID 5**
  - Uses parity.
  - Part of disk is used for foreign parity data
- **RAID 6**
  - Uses parity.
  - Part of disk is used for foreign parity data
  - Uses two different algorithms simultaneously



# UPS and backup power

- **Surge Protection**
- **Stabilizers**
- **UPS Uninterruptible Power Supply**
  - Equipment designed to provide time to shutdown machine or power on back-up power.
  - off-line standby system (voltage variation, it is switched on at a critical value).
  - off-line line-interactive system (guard voltage variations and is able to compensate)
  - on-line (device is constantly powered by UPS and it is charging from the network)
- **Key parameters**
  - Time switching (<4 ms)
  - Settling time and recovery time (time after which output voltage curve is not the malformation) (<50 ms)
  - Performance
  - Capacity (how much time we will provide UPS)
- **Motorgenerators**



# Cluster

- **High-availability clusters**

- Used to ensure continuity of service regardless of the potential problems that will affect resources

- **Load Balancing**

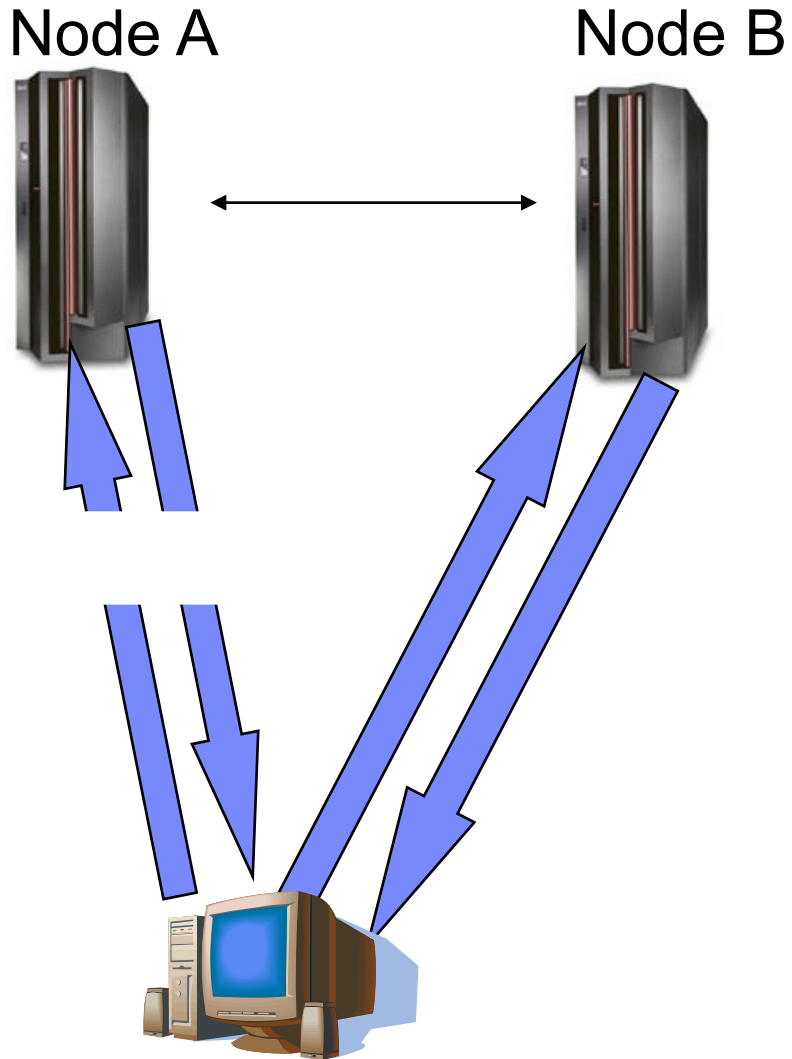
- Used for load balancing between multiple nodes

- **Computational clusters**

- Used to obtain high performance computing
- Cluster on application level
  - Special applications able to manage the distribution and communication of tasks
- Cluster on OS level
  - Most appropriate distribution of the nodes will handle OS.

# Cluster

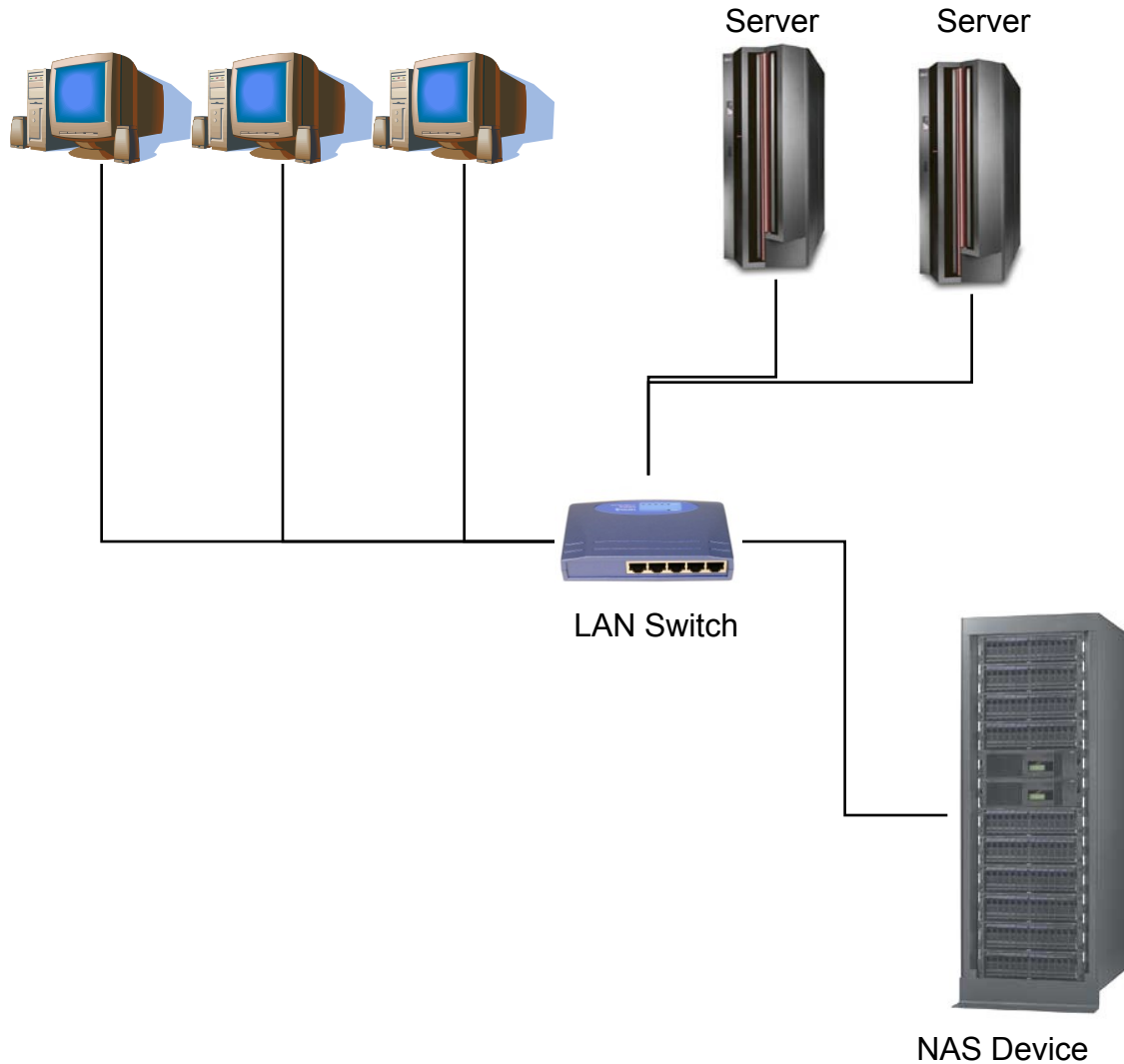
## High-availability clusters



## Computational clusters



# NAS (Network Attached Storage )

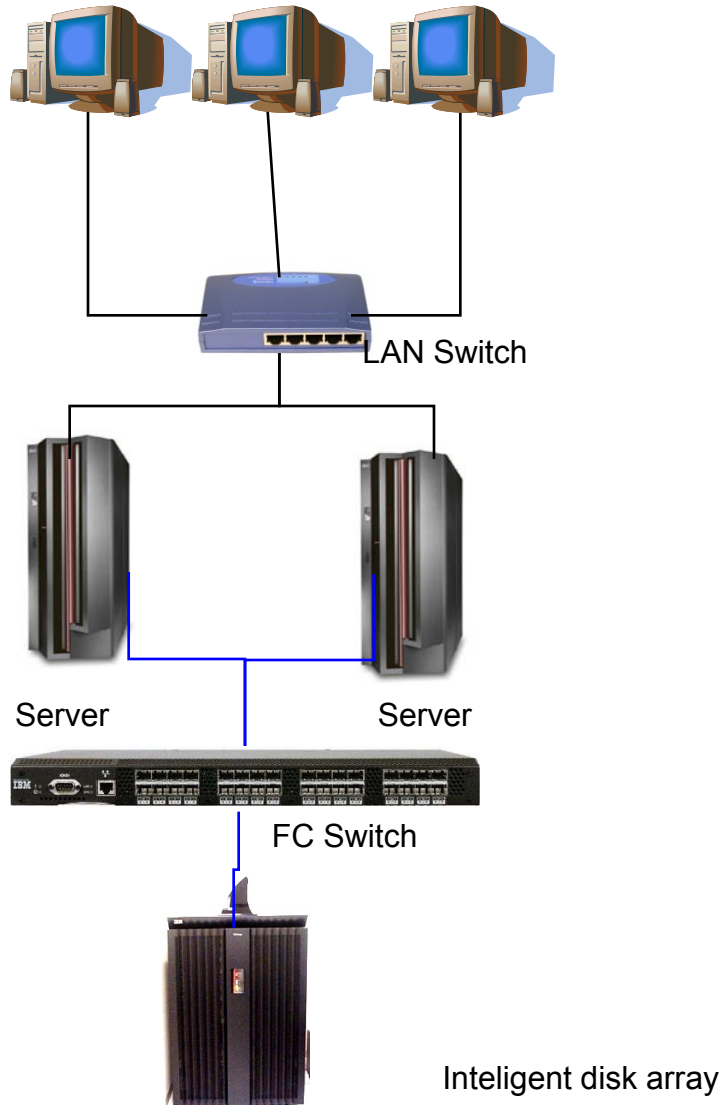


## N5500

- OS Data ONTAP™ 7.1
- Cache up to 8GB
- RAID support 4
- Capacity up to 84TB
- Support NAS, SAN



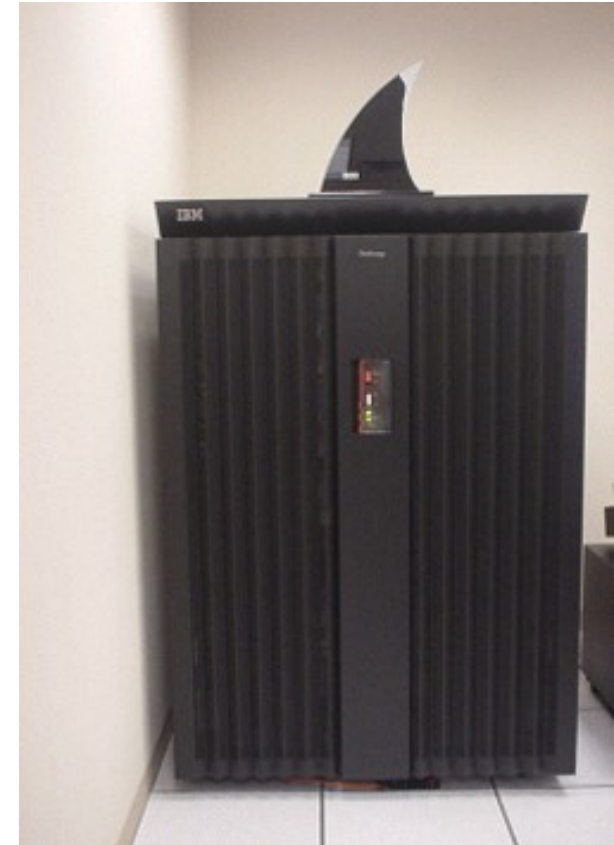
# SAN (Storage area network)



## Enterprise Storage server

### ESS 800

- Cache up to 64GB
- RAID support 5,10
- Capacity up to 56TB
- Support SAN
- Supports about 28 various OS and their clones

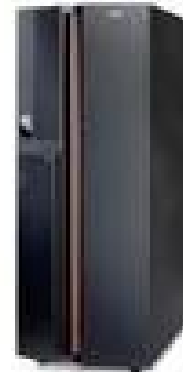


## Auditing

- **Record of access to protected resources**
  - Access to data storage (files, dataset, etc.).
  - Running applications (applications, batch, commands)
  - User login
- **The audit settings must be made very carefully because of performance and volume of data**
- **For non-critical items to create a record of unsuccessful approaches only**
- **Auditing can also be used for estimating the initial security settings**
- **In addition to the audit we have system and application logs. Usually, it can be set what should be logged**
- **Audit records, system logs and selected application log to be kept tens of days.**  
**Access to the audit, the system logs must be restricted to authorized persons only.**

# Categorization of computers

- **Personal Computer PC (IBM PC)**
- **Midrange (AS/400)**
- **Linux (AIX) servers (eServer p5 590)**
- **Mainframe (z890)**



# Transactions

## ■ Transactions

- smallest unit of work
- Atomicity - a transaction is the smallest unit of work, either they are all part of the transaction carried out or none
- consistency - after the transaction data must be in the data source in a consistent state
- isolation - the individual transactions are separated
- persistency - if the transaction is successfully finished than caused changes are permanent



## Batch file lives

- Batch file
- Administration
  - Streamlining routine repetitive activities
  - Efficient batch processing
  - A wide variety of scripting languages usually strongly linked with OS. (eg, REXX)
- Industrial and commercial applications
  - Effective way to mass data processing without human intervention
  - Easy modification
  - Using task scheduler (eg, TWS), you can link batches and create a batch very complex structure.
  - Again, a very wide variety of scripting languages (JCL, REXX)

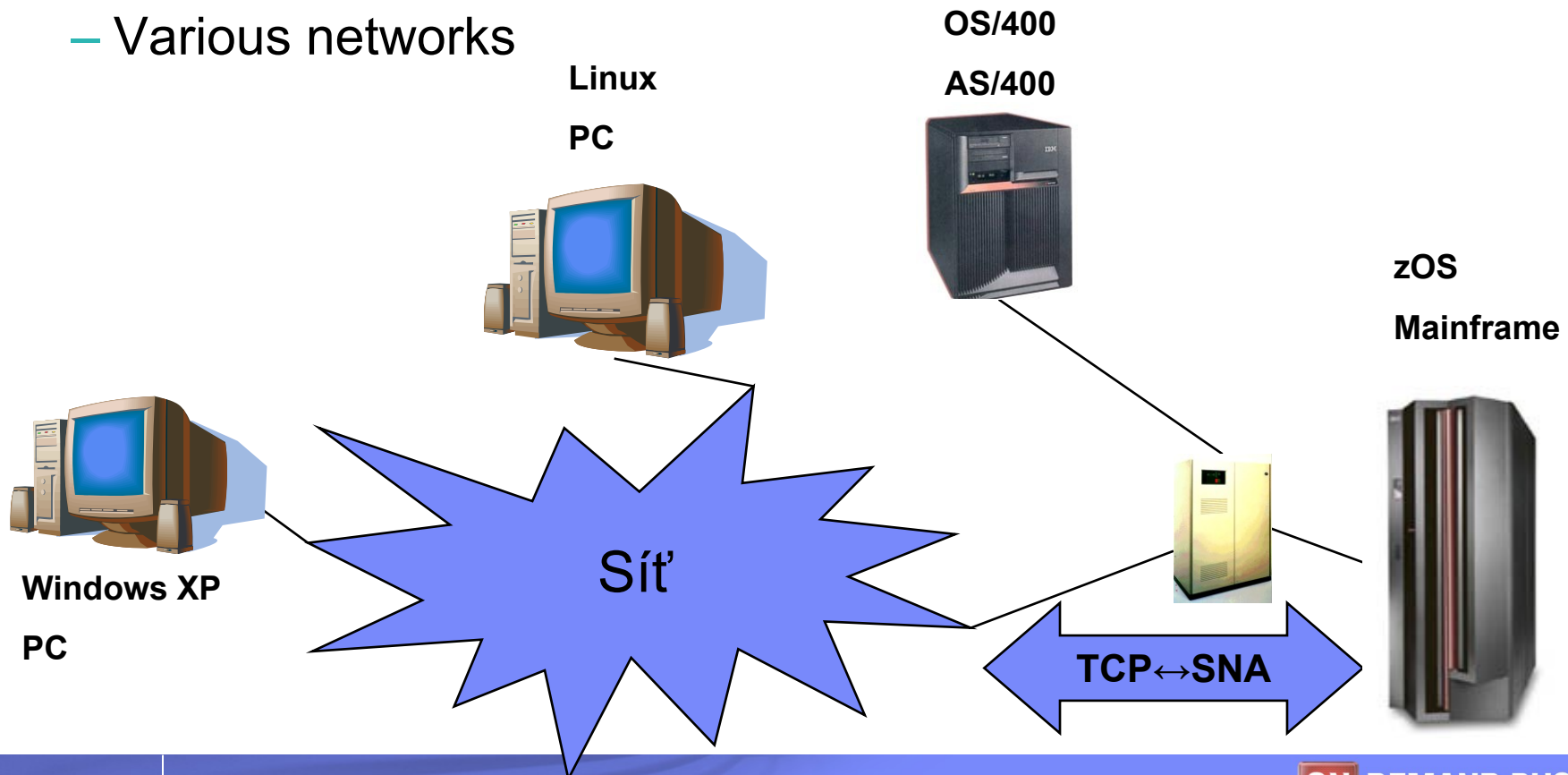
# Agenda

- **Heterogeneous environments and remote administration**
  - Heterogeneous environments
  - Remote administration
  - Products
  - Helpdesk
  - Follow the sun
  - Single point
  - Pro-active approach
  - Automatization
  - Administration on service level
  - TEC, SA TN

# Heterogeneous environments and remote administration

## ■ Heterogeneous environments

- Various HW
- Various OS
- Various networks



## Heterogeneous environments and remote administration

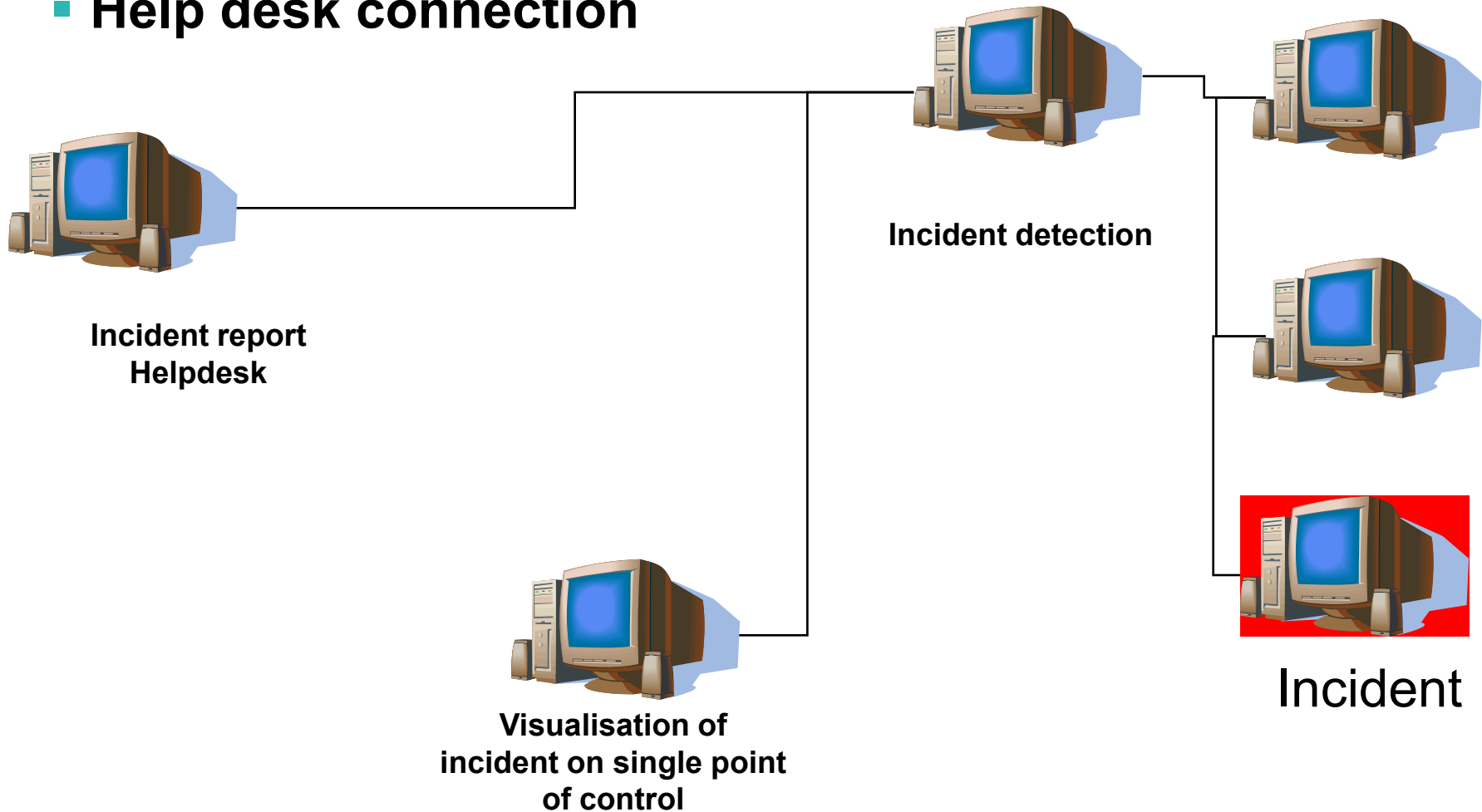
- **Remote administration**
  - Administration of networks and the Internet
  - Administration of Backup Management and SAN
  - Administration of systems and applications
  - Administration of processes
- **Single point administration**
- **Incident handling**
- **Pro-active approach and defect prevention**
- **System automation**

## Heterogeneous environments and remote administration

- **Usually a package of products under one name with the possibility of interconnections**
- **Cover many operating systems, types of networks, hardware and applications**
- **Main Products Remote administration**
  - OpenView (HP)
  - Unicenter TNG (CA)
  - Spectrum (Cabletron)
  - Tivoli NetView (IBM)
  - Sun Solstice (Sun Microsystems)

# Heterogeneous environments and remote administration

- **Help desk connection**



## Heterogeneous environments and remote administration

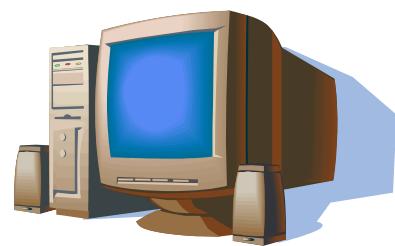
### ■ Follow the sun

- Handover of management between the centers located in different places depending on time of day
- Utilization of systems and errors appearance depends on the time of day
- Cost Savings
- Availability of support



# Heterogeneous environments and remote administration

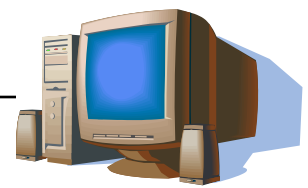
- Single point of administration



Incident	A	B	C	D
HW	1	2	0	0
DB	1	0	0	0
HDD	0	0	1	1
RAM	0	0	1	0
Print	0	0	0	1

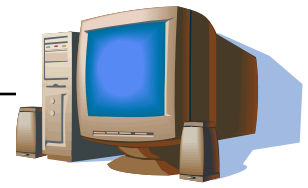
**System A**

Incident HW  
Incident DB



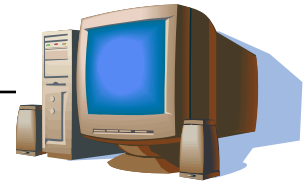
**System B**

Incident HW1  
Incident HW2



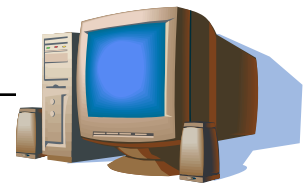
**System C**

Incident HDD  
Incident RAM



**System D**

Incident HDD  
Incident Print

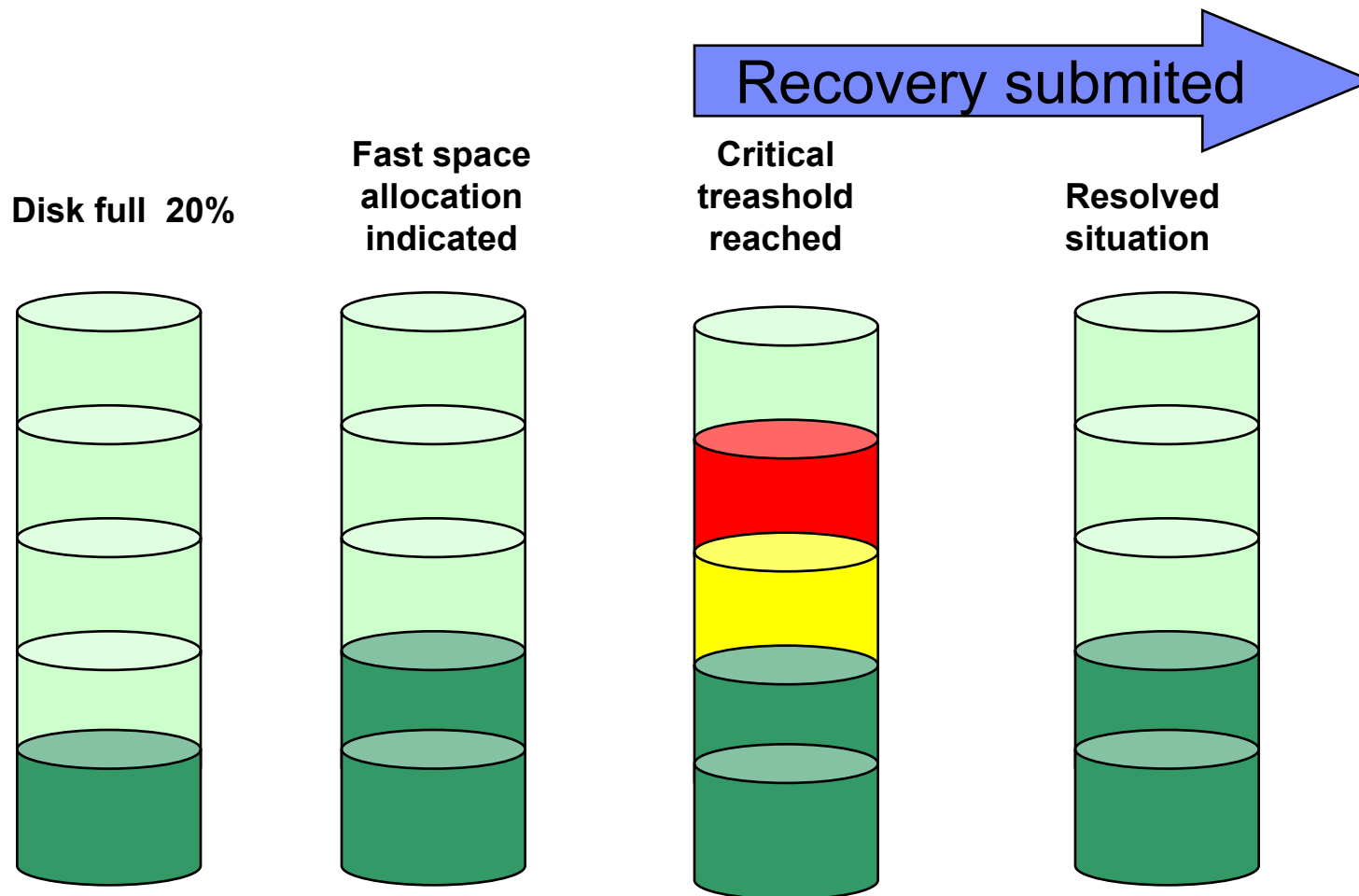


14:31 SYS A: Harmless problem DB  
14:11 SYS C: Serious problem RAM  
14:01 SYS A: FATAL ERROR HW



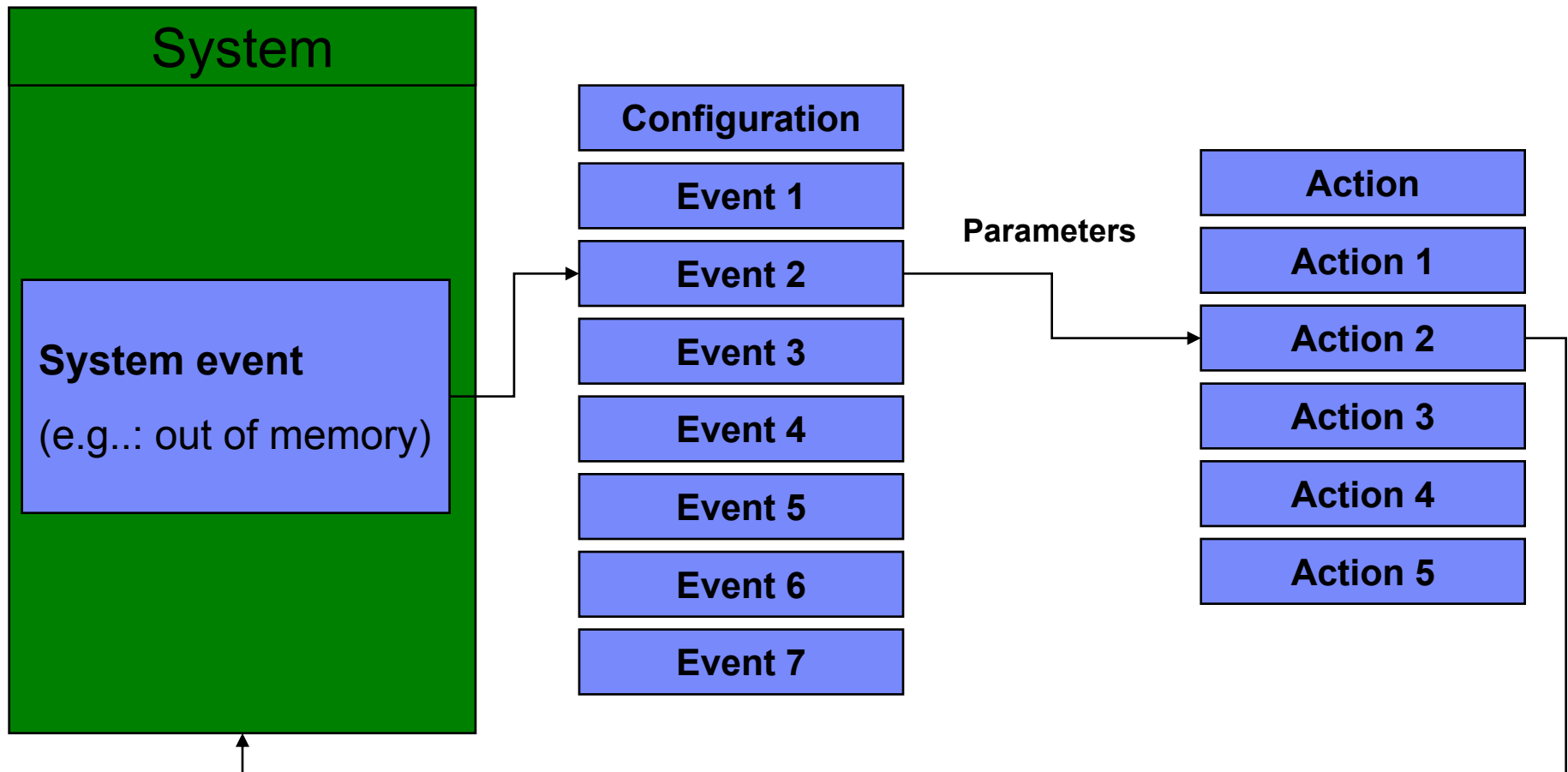
## Heterogeneous environments and remote administration

- **Pro-active approach and defect prevention**



## Heterogeneous environments and remote administration

### ■ System administration automatization



## Heterogeneous environments and remote administration

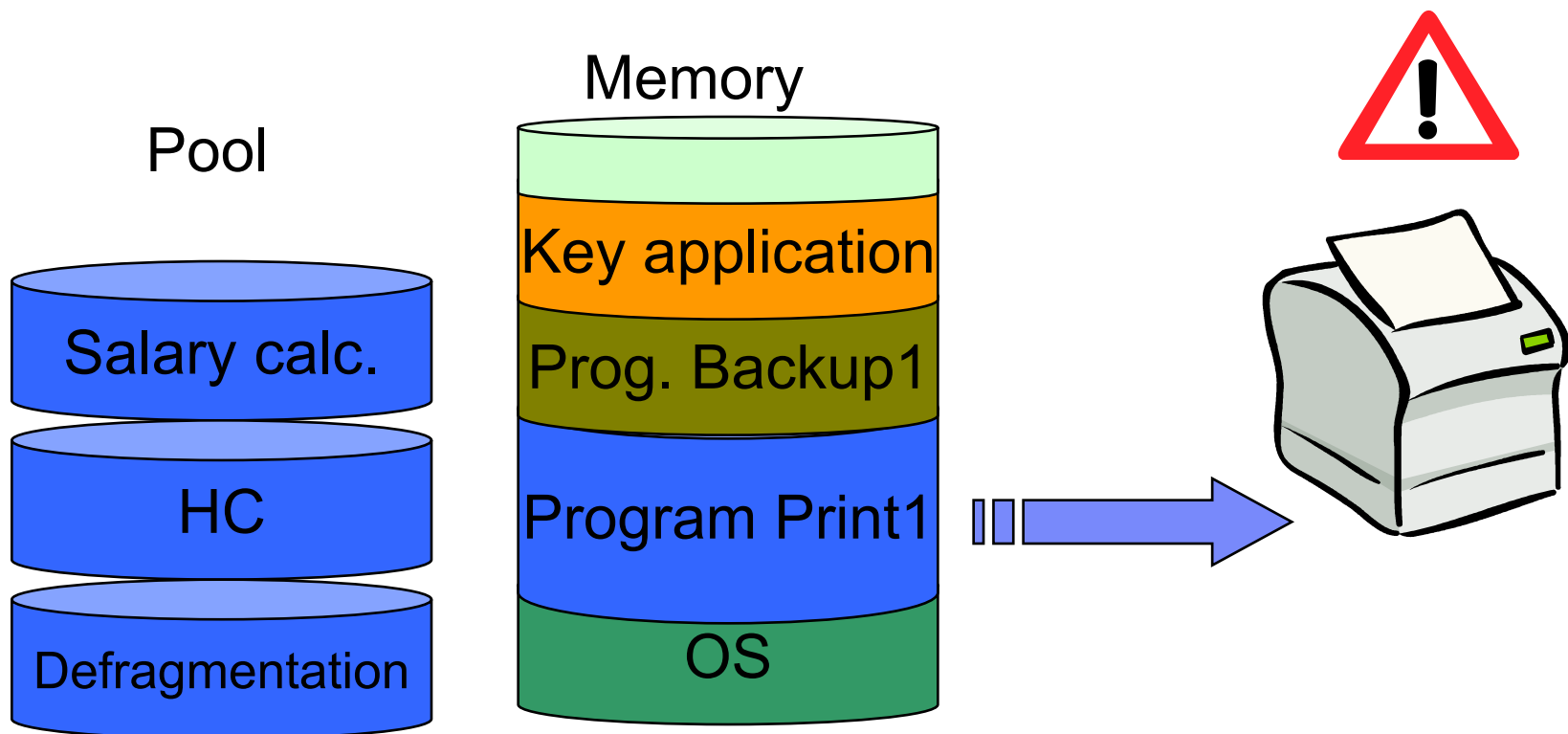
### ■ Administration at the service level

- Monitoring HW, OS and network status is not sufficient
- Customer interest is in its business rather than the state of HW, OS
- The need for special applications for monitoring transactions and run customer application (eg: IBM Tivoli Business Systems Manager and Candle OMEGAMON)
- Error at HW, OS or network results in a reduction in activity of the customer

# Heterogeneous environments and remote administration

## Administration at the level of services - an example

- The printer has jammed paper
- Print1 program can not print and is waiting
- Program Backup1 is waiting for the output of Print1
- Programs in the pool do not have enough memory and waiting



## Heterogeneous environments and remote administration

- **Administration at the service level**

- Batch flow – control over batch files with regard to the plan. It helps identify consequent delays and problems with the timely start of follow-up application
- Supervision of transaction applications. Supervision of the load and error rates (number of failed transactions).
- Supervision of key transactions
- Supervision on key applications. The diversity of applications makes this a particularly challenging task.

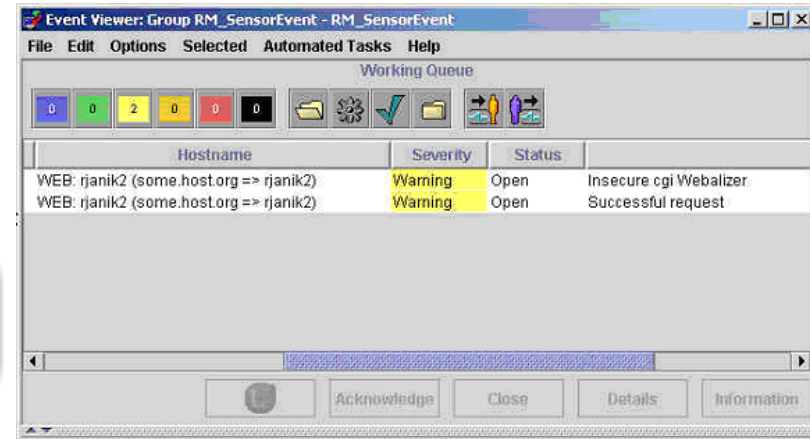
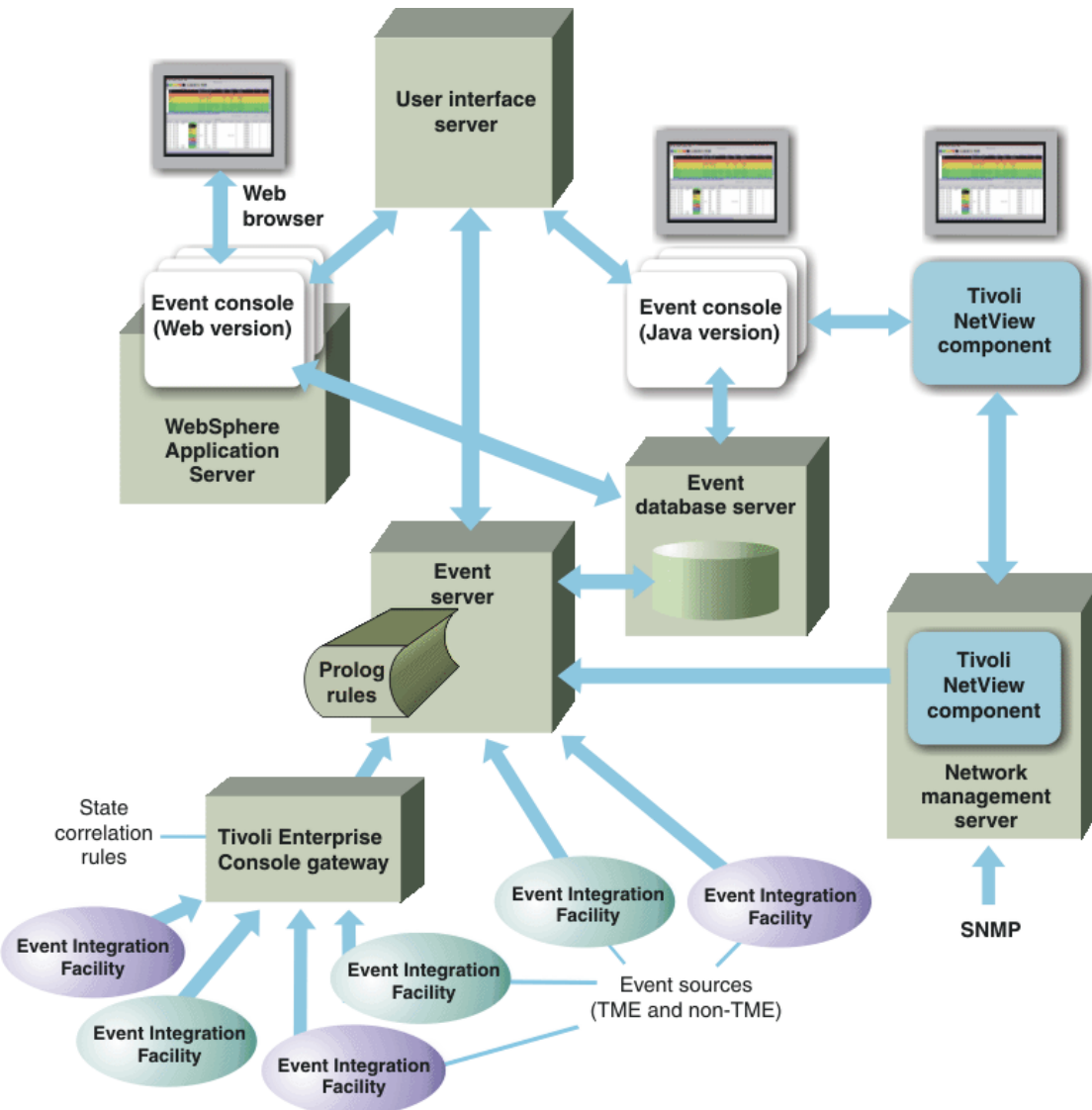
- **The result is**

- Warning of responsible administrator (human intervention)
- Automatic action (if used automation)

# TEC, SA NV

- **TEC – Tivoli Enterprise Console**
  - Central point of the whole suite of management products, Tivoli
  - Requires installed Tivoli Management Framework (TMF)
- **SA Netview – Tivoli System Automation**
  - Central point of management above many systems
  - Functions for self-corrections of system and key applications

# TEC – Tivoli Enterprise Console



# SA Netview – Tivoli System Automation

SDF-BPMADA00 Page 1 - Focal point 1 - MVS main panel Pf8 +

Location:	IBM	BANKS	DT 1 2	3 4	XY S	C O P O 3 A S L	1 2
gateway	x x	x x x x x x	x x x x x x	x x x x x x	x x x x x x	x x x x x x	x x
tscf	x x	x x x x x x	x x x x x x	x x x x x x	x x x x x x	x x x x x x	x x
applic	x x	x x x x x x	x x x x x x	x x x x x x	x x x x x x	x x x x x x	x x
ims	x x	x x x x x x	x x x x x x	x x x x x x	x x x x x x	x x x x x x	x x
cics	x x	x x x x x x	x x x x x x	x x x x x x	x x x x x x	x x x x x x	x x
db2	x x	x x x x x x	x x x x x x	x x x x x x	x x x x x x	x x x x x x	x x
hardware	x x	x x x x x x	x x x x x x	x x x x x x	x x x x x x	x x x x x x	x x
critmsg	x x	x x x x x x	x x x x x x	x x x x x x	x x x x x x	x x x x x x	x x
opcerr	x x	x x x x x x	x x x x x x	x x x x x x	x x x x x x	x x x x x x	x x
session	x x	x x x x x x	x x x x x x	x x x x x x	x x x x x x	x x x x x x	x x
wtor	x x	x x x x x x	x x x x x x	x x x x x x	x x x x x x	x x x x x x	x x
network	x x	x x x x x x	x x x x x x	x x x x x x	x x x x x x	x x x x x x	x x
storage	x x	x x x x x x	x x x x x x	x x x x x x	x x x x x x	x x x x x x	x x
tape	x x	x x x x x x	x x x x x x	x x x x x x	x x x x x x	x x x x x x	x x
security	x x	x x x x x x	x x x x x x	x x x x x x	x x x x x x	x x x x x x	x x
misc	x x	x x x x x x	x x x x x x	x x x x x x	x x x x x x	x x x x x x	x x
spool	x x	x x x x x x	x x x x x x	x x x x x x	x x x x x x	x x x x x x	x x
flags	x x	x x x x x x	x x x x x x	x x x x x x	x x x x x x	x x x x x x	x x

PF1=Help 2=Det 3=End 4=IPL 5=Info 6=Roll 8=Dn 9=Cmd 10=OC 11=SC 12=Top

23/007

SA z/OS Command Dialogs Line 1 of 114  
Domain ID = DISPTREE Date = 03/07/0  
Operator ID = C2 Time = 19:02:27

Subsystem ==> CNMS System ==> Dependency ==> START

```

CNMS
  +-- CNMSSSI
    +-- RACF
      +-- VLF
        +-- LLA
          +-- JES
            +-- EPWFFST
              +-- FBIAM
                +-- IDIS
                  +-- SOFTAUDT
                    +-- VTAM
                      +-- APPC
                        +-- MCFOMSTR
                          +-- MFOFCHIN
                            +-- RDJDE
                              +-- RDJTR
                                +-- RDJXP
                                  +-- BBCAS
                                    +-- BFFMON
                                      +-- BBVLAS
                                        +-- BBFOMON
                                          +-- BBVLAS
                                            +-- BBFOMON
                                              +-- BBVLAS
                                                +-- STOPX37
                                                  +-- CAS9
                                                    +-- CONNECT
                                                      +-- CXFFTORE
                                                        +-- CXFFBESA
                                                          +-- CXFFOED
                                                            +-- CXFFDIPE
                                                              +-- CXFFGEIN
                                                                +-- CXFFINTR
  
```

Command ==> PF1=Help PF2=End PF3=Return PF4=Focus PF5=Info PF6=Roll PF7=Help PF8=Forward PF9=Refresh PF11=Right PF12=Retrieve

01/002

SDF- MO - Critical messages page 1 of 4

Time	MsgId	Message Text
18:53	IEF089I	JOB ESNFJSV1 J0831015 - WAITING FOR DATASETS
19:13	BAF083W	ACK-> NVFTP MONITOR DETECTED WAITING REQUEST(S) FOR CLASS(ES)
08:00	MOCHCK01	MOCHECK STARTED AT 08:00:01
08:02	MOCHCK01	MOCHECK FINISHED AT 08:02:47
08:33	BAF430I	DFHSM QUEUE MONITORING IS STARTED.
22:03	BAF428I	DFHSM ACTIVE MONITORING IS STARTED.

PF1=Help 2=Detail 3=Ret 4=Ack 5=Dialog 6=Roll 7=Up 8=Dn 9=Del 10=DelAlt 12=Top

23/001

SDF- 00 - Subsystems status page 1/8

Subsystem	Subsystem	Subsystem	Subsystem	APG Status	Replu	Jobname
TCPSNMP	SDSF	ATH	DB2ODIST	1	CNMS	
CNMSSSI	NPM	RRS	DB2OMSTR	54	CX0JMR	
CNMS	DFRMM	RDS	DB2OSPAS			
RACF	STOPX37	DOMDC00	CONNECT			
EPWFFST	OAM	CNMSAM	NMFIR02			
LLA	JESA	IDIS	OPCC			
VLF	OPCT	TSPRFIOP	TCPIP			
CICNVPP1	BFFMON	NM	SAMCTL0			
TWSCMDSRVR	RNF	DB2FIRLM	TCPOMPR			
TWSREQSRVR	BBFOMON	DB2FDBW1	SAMS			
JES	BBFOMON	DB2FDIST	RMDSF10			
VTAM	BBVLAS	DB2FMSTR	NETFTP			
BBCAS	RMFGAT	DB2FSPAS	FTPSRPO2			
APPC	OPC0BSERVER	DB2OIRLM	FTPSECET			
TSO	SDSFA	DB20DBM1	FTPSRCNC			

gateway tscf ims cics db2 links h/w storage misc batch network critmsg tape wtor security spool

PF1=Help 2=Det 3=Ret 4=Ack 5=Ctl 6=Roll 7=Up 8=Dn 9=Start 10=Stop 11=Cycle 12=Top

23/007

SA z/OS Command Dialogs Line 1 to 2 of 2

```

Path ==> RHTCHD Operator ID ==>
Sub ==> Network ID ==>

```

RECEIVE LOCAL TIME=18:58:56 DATE=2007.0 GMT TIME=17:50:56 DATE=2007.0

Action (enter=Refresh) ==> PF1=Help 3=End 6=Roll 9=Clear 11=Right 12=Retrieve

01/002



# Questions?

