



burtSave

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Outline

- burSave and caPut logging
Monitoring any change using ca
- caPut logging and iocPutLogServer
- burtSave and warm reboot
Monitoring changes of a give record list
- ioc reboot options (conditional)
 - burtwb
 - dbloadDatabase

burtSave

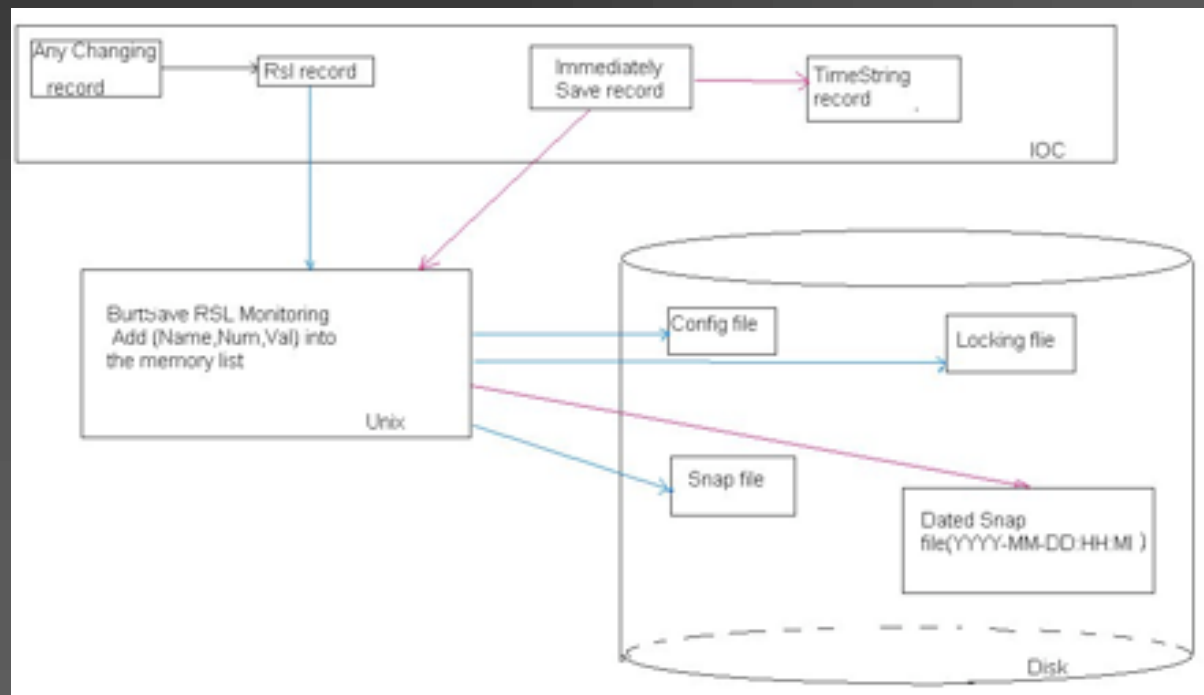
- BurtSave is clone of standard APS BackUp and Restore Tool. Output of burtSave is compatible with BURT so we can use it as input for burtwb.
- BurtSave works in WS-level (Sun-Solaris). This program write data to disk periodically (program option, default is 20 sec.) or by request (writing a value to special binary-soft-channel, typically by medm).

burtSave

- BurtSave has 2 main regimes:
- 1) Full regime and 2) List regime
- 1) Full regime – all “external” changing of all PVs will be monitored and written (based on CAS-hook)
- At DESY for a each IOC we have special RSL-record. This is string array-record.(Resident String Logger)
- Last CAS request is stored here. Typical RSL-value is
- 01-DEC-04 11:13:12 epicsg mkk_user fred_ao old=0.12 new=0.13 (min=0.05 max=0.34)

burtSave (monitoring any caPut)

- burtSave is simply monitoring this record on WS-side.
- It's possible to exclude storing some record subset by using special option:
- `burtSave --exclude "*soft*ao CGG_* HNSI61GG_ai "`

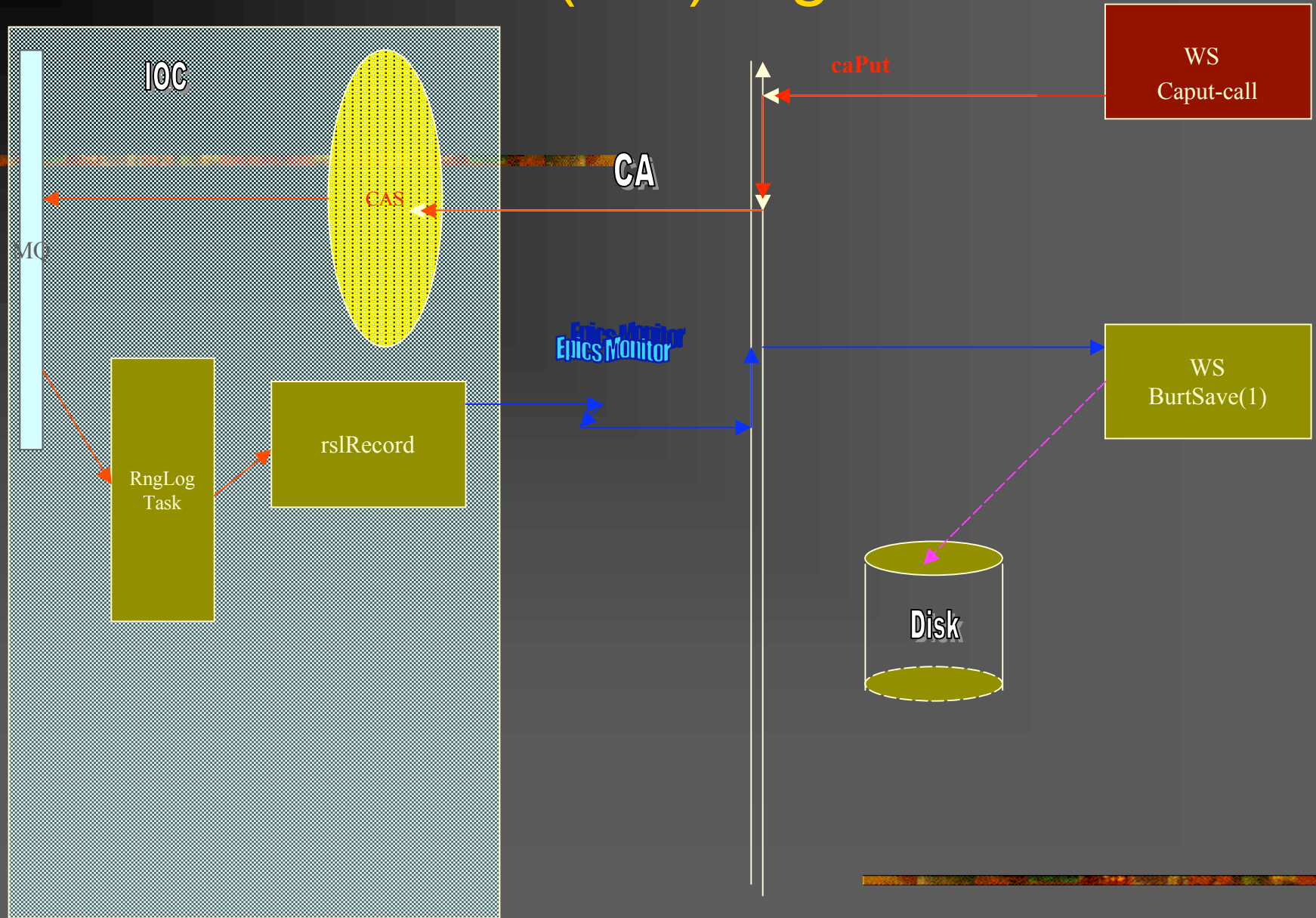


burtSave

(monitoring any caPut)

- Advantages of this method:
 - Capture all changes written to IOC
 - Keep overview of all fields ever changed in a single file
- Disadvantages of this method:
 - The file might not be useful for writeback (the order things have been changed is not necessarily the right order to write them back during reboot)
 - Internal changes (record \leftrightarrow record/ SNL \rightarrow records) are not captured

burtSave and ioc(Put)LogServer

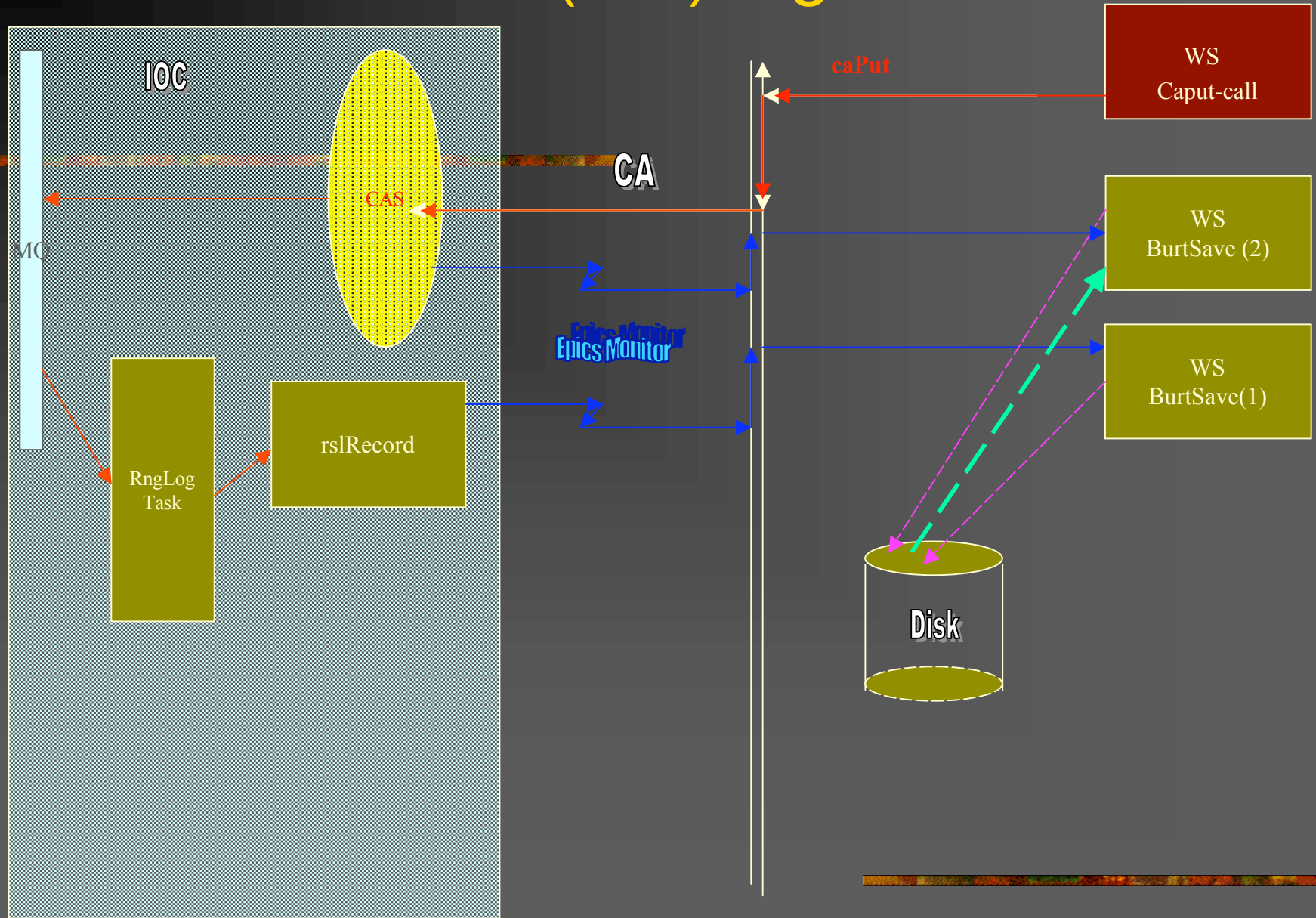


burtSave

(monitoring list of records – 2nd regime)

- 2) List regimen
 - a list of PVs is monitored
 - Monitor any desired field of any record (Capture also IOC-internal changes)
 - Setup the list in a way that records and fields are written in the ‘right’ order

burtSave and ioc(Put)LogServer



burtSave

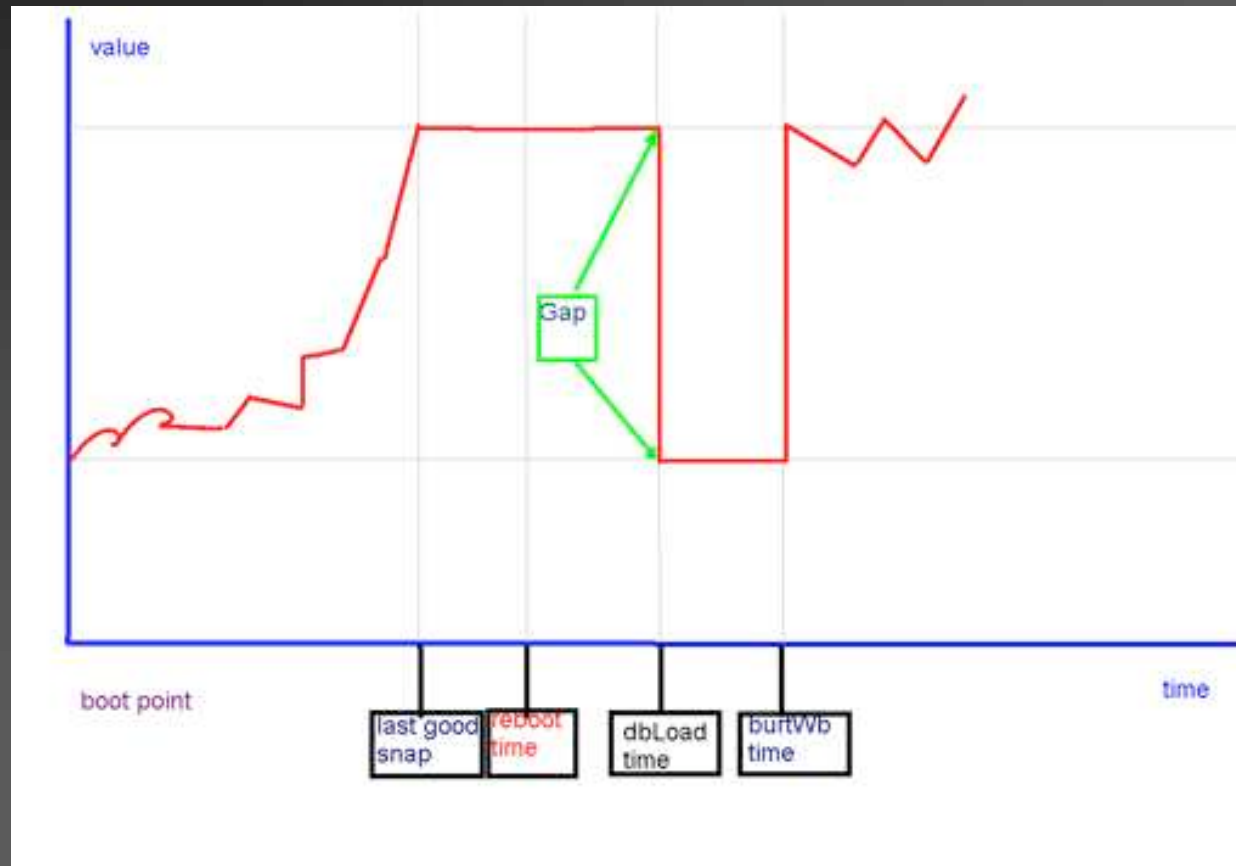
(and the problem during IOC reboot)

- If IOC is disconnected or switch off:
- We also add special saveEnable binary record. If this PV is unavailable or it's value is equal zero burtSave does nothing. In IOC initialization script this value is set to 1. This allows us to not store the first value which is coming from static db-file during initialization, and also stop all store activity during shutdown or power off.

Bumpless Reboot: Special output for burtSave

- Standart burtwb does not allow really smooth warm reboot. Why? Because for any PVs we set value twice in dbLoad (before `ioc_init()`) and in burtwb after `ioc_init()` .Actually we can have some *gap* in data (see next picture)

Bump'full' reboot using burtwb



Bumpless Reboot using db files

- A real bumpless rebot is possible if the desired data are either written to the loaded database, or of the databases is 'overloaded' by the desired settings.
- burSave can also create db files
- Typical db-output created by burtSave:

#1102000618 - unix-time this is commentary line

```
record(diglog,"HZF:V17_dlog") {  
  field(CMD,"0")
```

```
} .....
```

```
record(diglog,"HZF:V21_dlog") {  
  field(CMD,"3")
```

```
}
```

Bumpless Reboot loading db files (conditional loading)

- Then we can overload db files by using the `dbLoadRecord(filename)` – call.
- There might be cases where stored data are too old for a smooth reboot.
 - If the conditions changed
- Loading db files with most recent changes only if the data are not too old.

Bumpless Reboot

(loading db file on time condition)

- To allow (time) conditional loading we use a small C-program which checks the difference between the current ioc time ($T1 = \text{now}$) and the file time $T2$ which comes from comment line of db-file (written by burtSave).
- For example If $|T1 - T2| < 20 \text{ min.}$
dbLoadRecord(burtSaveDB-file)
- Else do nothing, default values from the ioc database files will not be overwritten.

caPut logging and locLogMsgServer

Communication between IOC part and WS level is simple TCP/IP-socket based client–server mechanism.

WS caPutLogger and IOCLogMsgServer is one executable Unix server task with different ports:

Export `EPICS_IOC_CA_PUT_LOG_PORT=7010`

Export `EPICS_IOC_LOG_MSG_PORT=7004`

caPut logging and locLogMsgServer

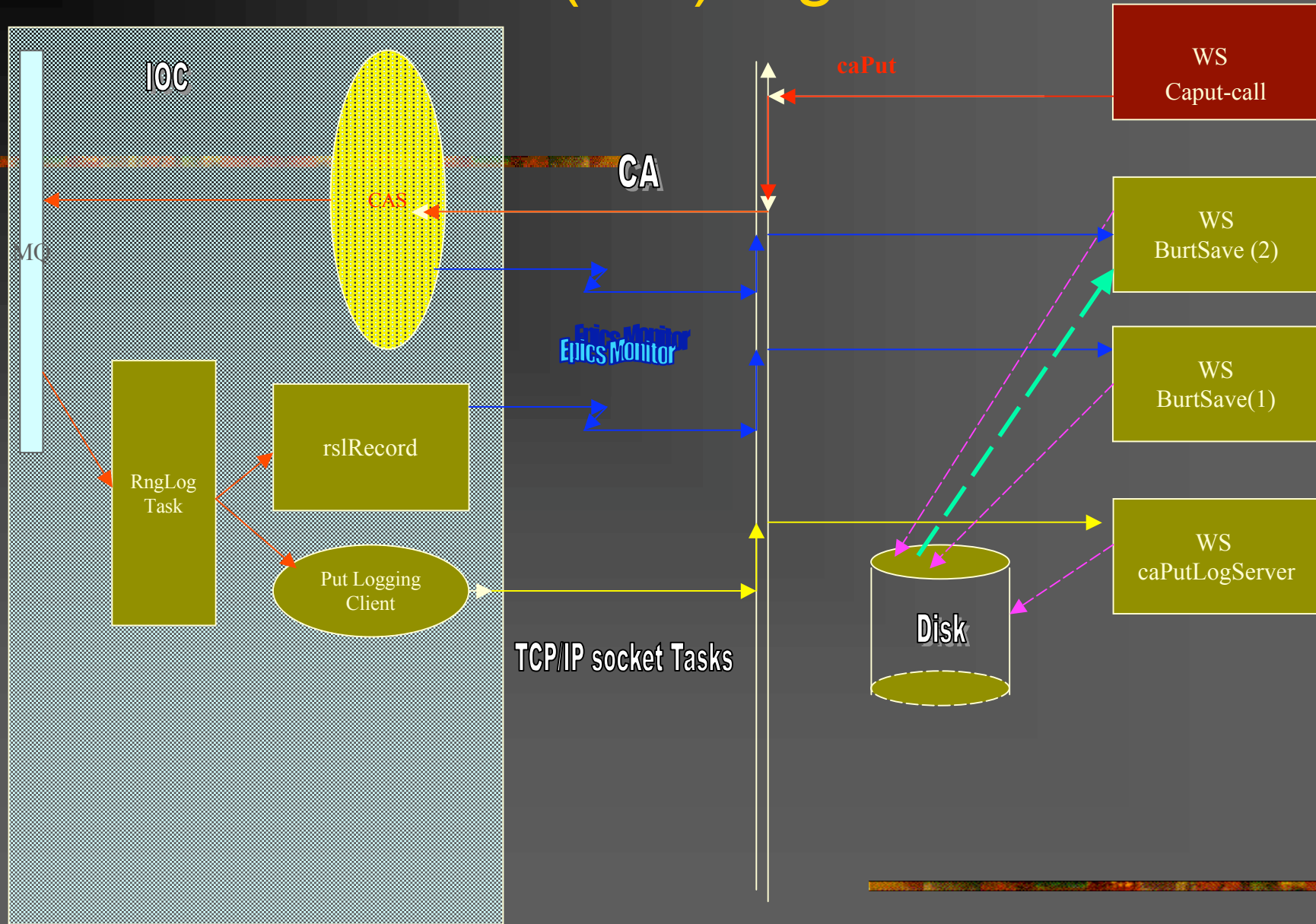
- Use CAS implementation as a hook for CA-put logging
- Info has format

28-Sep-04 14:39:12 kryksunh kagarman HZF:CV 4_pid.KP new=0.2 old=0.3

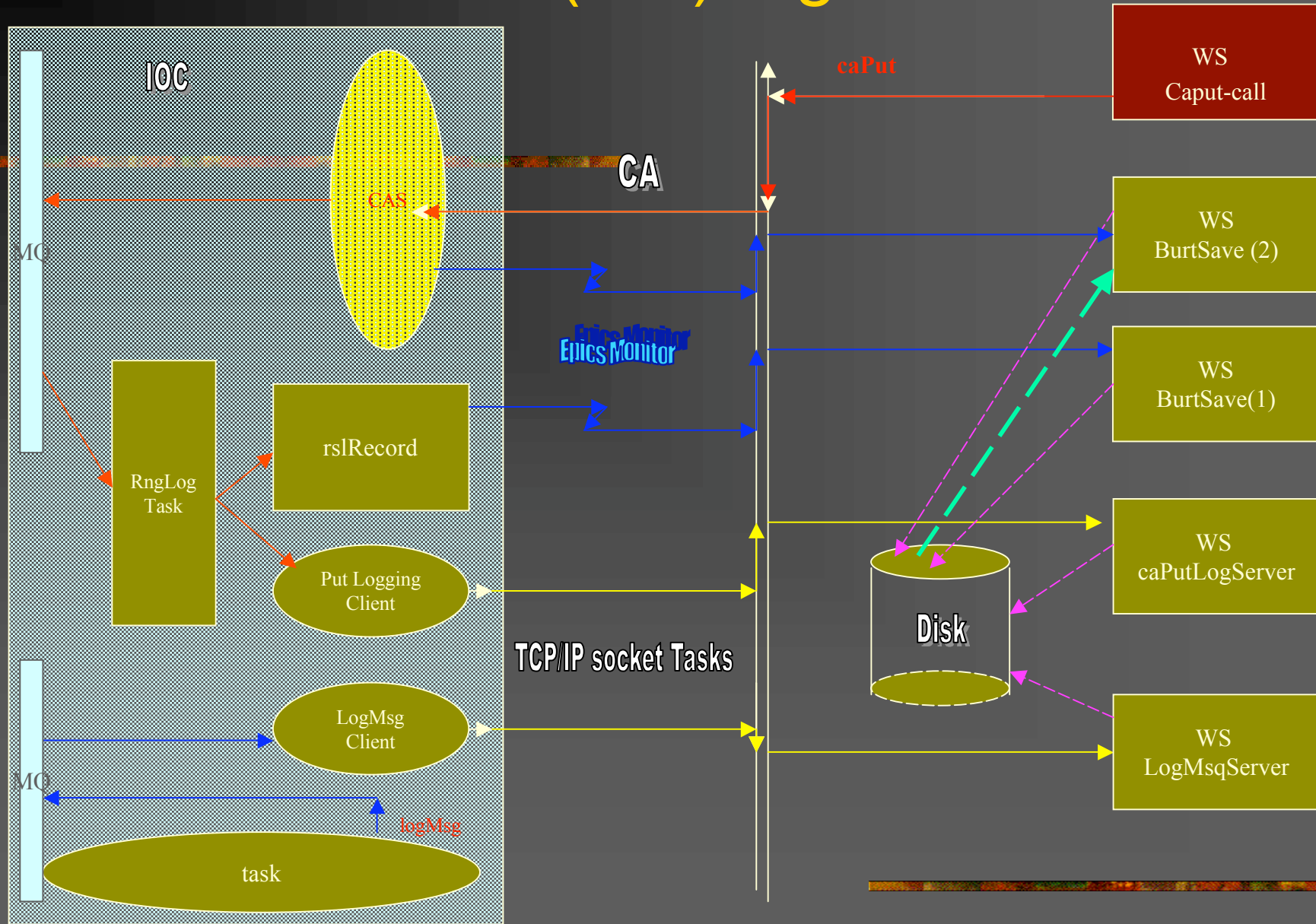
- This info coming from IOC message queue and tcp/ip socket task to WS-level.
- The same procedure for logMsg-IOC-call. Typical format

2004-11-09 09:37:38 Illegal Request V: HZF:T16P_ai.TIME error detected in routine: db_name_to_addr error
2004-08-09 16:35:01 0x7728390 (Seq_Alarms): 33 of 8 0 assigned channels have connected

burtSave and ioc(Put)LogServer



burtSave and ioc(Put)LogServer



caPut logging and locLogMsgServer

- Output for ioclogServer is splitted by “logical IOC host”
- Physical2logical table as static file:

epicsGPFC01 mkk10KVA1

epicsGPFC06 mkk10KV2B

...

epicsPC11 datLog11

epicsPC21 mthKryoStand

epicsPC22 heraKryoZeus

Conclusion - burtSave

- The latest burtSave version provides real warm reboot features using:
 - List of records.fields to be monitored
 - db files
 - time-conditional loading
 - locName:burtEnable_bi (save files only if this binary record is valid AND not zero)

Conclusion - iocPutLogServer

- One image for iocLogMessages and iocPutLogServer
 - One logfile for each IOC
 - Mapping IP-Names to logical IOC names
 - Execute command (send mail) on logfile size
 - iocPutLogServer keeps track of any external (caPut) change to the IOC

Appendix:

- Option for burtSave:

burtSave -c confFile -l lockFile -d saveDir

[-i interval]

[-e=epicsDbFileOutputFacility]

[-b=directMonitorFacility]

[-x "formatList" forSubSetOfRecordExcluding]

Appendix:

- Config file for burtSave

```
#####
```

```
1.4          # burtSave version
```

```
# first 4 uncomment line is special PVs suffixes, then IOC names
```

```
#####
```

```
:caPutMsgLog_rsl    # rsl-record suffix full name is epicsPC04:caPutMsgLog_rsl
```

```
:setRebootSav_bi    # immediately create snap-file
```

```
:last_burt_str      # time for previous
```

```
:burtEnable_bi      # Enable/Disable snap-file writing
```

```
# applications IOC host alias name here:
```

```
epicsPC04
```

```
heraKryoZeus
```


Appendix:

- burtSave Snap-file (as in APS burt)
--- Start BURT header
Time: Fri Sep 3 11:00:00 2004
Login ID: archiver (Archiver User)
Eff UID: 901 Group ID: 100
Keywords: Comments: Type: Absolute
Directory /import/epicsf2/applic/burtSave/bin
Req File: /applic/burtSave/conf/burtSave.conf
--- End BURT header
HZF:P1_ai.HIGH 1 1.23457
HZF:P1_ai.VAL 1 2.34568
HZF:V22_dlog.CMD 1 0
HZF:P10_ai.HIGH 1 0
HZF:CV8_ao.VAL 1 0
HZF:V2_dlog.CMD 1 0
HZF:V3_dlog.CMD 1 0
HZF:V17_dlog.CMD 1 0

Appendix:

- burtSave DB-file

#1102086487 comment line Unix-time for file creation

```
record(diglog,"HZF:V17_dlog") {  
    field(CMD,"0")  
}  
record(diglog,"HZF:V18_dlog") {  
    field(CMD,"0")  
}  
record(pid,"HZF:CV28_pid") {  
    field(SOUT,"2.700000e+01")  
}
```

Appendix:

- Phys2logical.tbl
 - epicsGPFC01 mkk10KVA1
 - epicsGPFC02 mkk10KVB1
 - epicsPC11 datLog11
 - epicsPC12 datLog12
 - epicsPC13 datLog13
 - epicsPC14 datLog14
 - epicsPC15 datLog15
 - epicsPC21 mthKryoStand
 - epicsPC22 heraKryoZeus
 - epicsPPC01 radmes
 - epicsPPC02 mkkPPC02
 - epicsPPC03 vacuumCompress2
 - epicsPPC04 VC2Test
 - epicsPPC05 ttfRadMes
 - epicsPPC11 mkkSender
 - epicsVME07 krykWetter

Appendix:

- Environment variable for iocLogServer

```
EPICS_IOC_LOG_PORT=7004
EPICS_IOC_LOG_FILE_NAME=$TOP/log/iocLogServer.log
EPICS_IOC_LOG_FILE_LIMIT=1000000
EPICS_IOC_LOG_CONFIG_FILE_NAME=$TOP/iocLogServer.conf
EPICS_IOC_LOG_PHYS2LOG_TBL_NAME=$TOP/phys2log.tbl
EPICS_IOC_LOG_MAIL_SUBJECT='iocLogServer output file is too
big!' EPICS_IOC_LOG_COMMAND='sh $BIN/smsToLogbook.sh'
EPICS_IOC_LOG_COMMAND_HOWTO=23
EPICS_IOC_LOG_COMMAND_SUBJECT='iocLogServer output file
is too big'
```

Appendix:

- Config file for iocLogServer

```
epicsVME70.desy.de {
  monthly {
    logfile=/applic/iocLogServer/mth/mthKryoLT.log; limit=1000000; mail=michael.schwarzer@desy.de
  }
}
epicsVME35.desy.de {
  monthly {
    logfile=/applic/iocLogServer/hera/heraKryoFel.log; limit=1000000; mail=bernd.schoeneburg@desy.de
  }
}
epicsVME40.desy.de {
  monthly {
    logfile=/applic/iocLogServer/ttf/ttfKryoFV.log; limit=1000000; mail=bernd.schoeneburg@desy.de
  }
}
```

Appendix:

- outPut file for iocCaPutLogServer:

[epicsPC22 <-> heraKryoZeus] 2004-08-09 16:33:52 09-Aug-04 16:38:54 kryksung claus
heraKryoZeus:setRebootSav_bi.VAL new=0 old=0

[epicsPC22 <-> heraKryoZeus] 2004-08-09 16:33:57 09-Aug-04 16:38:54 kryksung claus
heraKryoZeus:last_burt_str.VAL new=2004-08-09:16.33 old=2004-08-09:16.36

[epicsPC22 <-> heraKryoZeus] 2004-08-10 08:59:59 10-Aug-04 09:05:05 kryksunh schoeneb
HZF:CV4_pid.AM new=M old=A

[epicsPC22 <-> heraKryoZeus] 2004-08-10 09:00:06 10-Aug-04 09:05:08 kryksunh schoeneb
HZF:CV4_pid.SOUT new=100 old=100 min=29.8701 max=100

[epicsPC22 <-> heraKryoZeus] 2004-08-10 09:01:00 10-Aug-04 09:06:06 kryksunh schoeneb
HZF:CV7_ao.OMSL new=supervisory old=closed_loop

[epicsPC22 <-> heraKryoZeus] 2004-08-10 09:01:04 10-Aug-04 09:06:09 kryksunh schoeneb
HZF:CV7_ao.VAL new=100 old=100 min=46.7533 max=100

[epicsPC22 <-> heraKryoZeus] 2004-08-10 09:01:06 10-Aug-04 09:06:11 kryksunh schoeneb
HZF:CV7_ao.OMSL new=closed_loop old=supervisory

[epicsPC22 <-> heraKryoZeus] 2004-08-10 09:01:07 10-Aug-04 09:06:12 kryksunh schoeneb
HZF:CV16_ao.OMSL new=supervisory old=closed_loop

Appendix:

- outPut file for iocLogMsgServer:

```
[epicsPC22 <-> heraKryoZeus] 2004-11-08 13:05:14 0x74e7e94 (CA_event): rsrv:  
socket shutdown error was S_errno_EPIPE
```

```
[epicsPC22 <-> heraKryoZeus] 2004-11-09 09:37:38 filename="../recGbl.c" line  
number=62
```

```
[epicsPC22 <-> heraKryoZeus] 2004-11-09 09:37:38 Illegal Database Request Type P V:  
HZF:T16P_ai.TIME error detected in routine: db_name_to_addr error
```

```
[epicsPC22 <-> heraKryoZeus] 2004-11-09 09:37:38 filename="../recGbl.c" line  
number=62
```

```
[epicsPC22 <-> heraKryoZeus] 2004-11-09 09:37:38 Illegal Database Request Type P V:  
HZF:T16P_ai.TIME error detected in routine: db_name_to_addr error
```

```
[epicsPC22 <-> heraKryoZeus] 2004-11-09 09:37:38 filename="../recGbl.c" line  
number 12
```

burtSave and ioc(Put)LogServer

