



# Clipper/Schooner Fault and Error Management

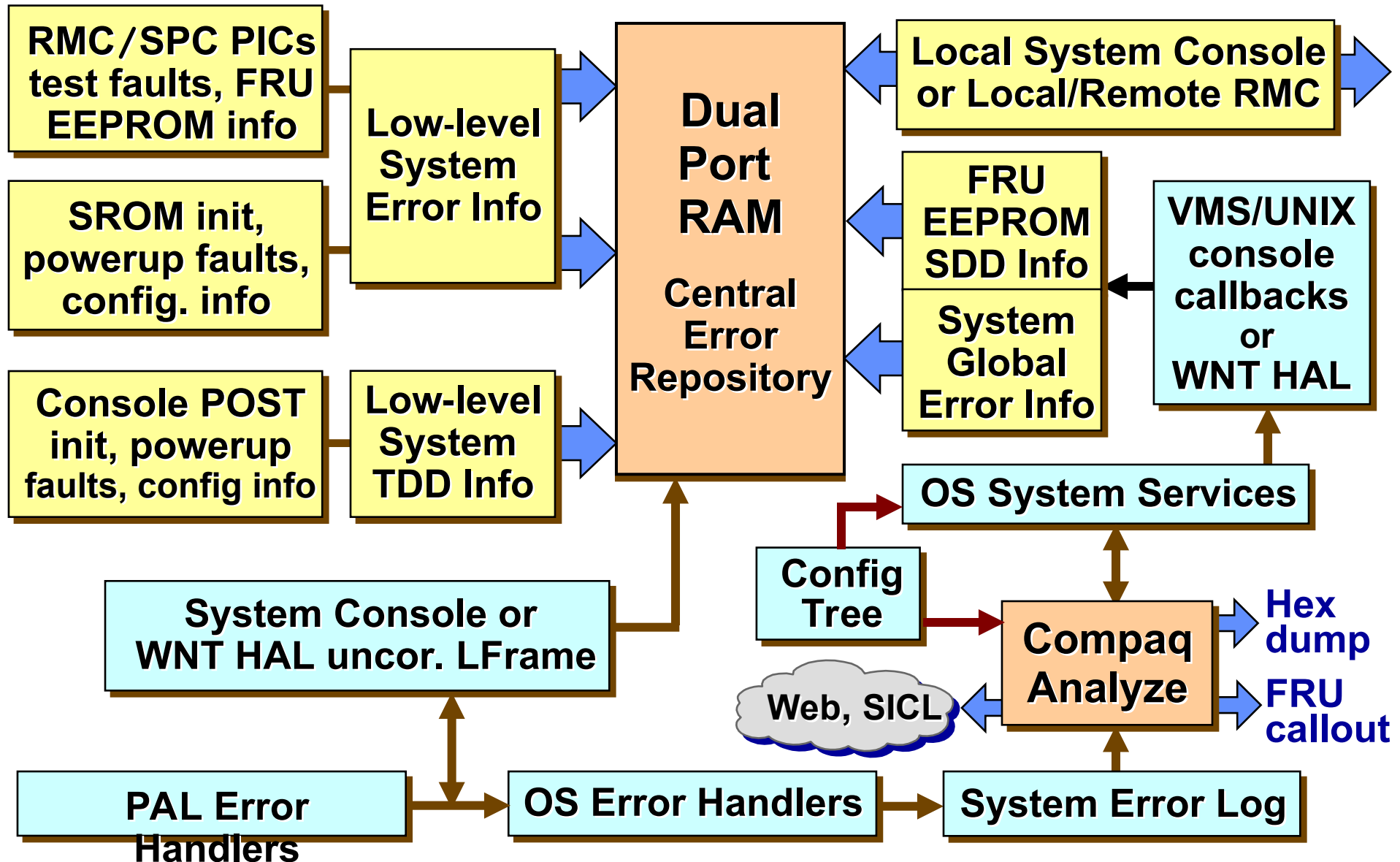
**Dick Faria**

**Serviceability Engineering**

**Wednesday, Nov. 18**

- **Product Fault Management Design Overview**
- **System Error Categories**
  - General Fault Classes
  - Troubleshooting Facilities
- **Fault Management Error Detection, Capture, & Logging**
  - Dual Port RAM (DPR) Structure & Content
  - FRU EEPROM Structure & Content
  - Symptom Directed Diagnosis (SDD) Log
  - Error Logout Frames
  - Event Log Structure
- **Compaq Analyze Usage Overview**
  - Components, Enterprise Model, & FRU Analysis Ruleset
  - FRU Callout & Hex Dump Example
- **CANASTA-NG Usage Overview**

# Fault Mgmt Design Overview



# System Error Categories

1

- ✓ CPU or system hard uncorrectable fault/error
- ✓ Can not run SRM or AlphaBIOS console or reboot OS

2

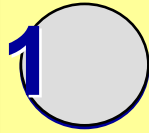
- ✓ CPU or system hard uncorrectable fault/error
- ✓ Able to run SRM or AlphaBIOS console, but can not reboot OS

3

- ✓ CPU or system intermittent or hard uncorrectable error
- ✓ Able to run SRM or AlphaBOIS console and reboot OS

4

- ✓ System or CPU correctable fault/error
- ✓ System operation is sustained



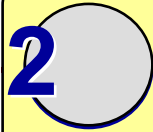
- ✓ CPU or system hard uncorrectable fault/error
- ✓ Can't run SRM/AlphaBIOS console or reboot OS

## General Fault Classes

- **SROM power-up sequence, initialization or self-test fatal fault, such as:**
  - No Primary CPU can be established
  - No available system memory can be established
  - No subsystem Power-On OK can be established
  - Tsunami/Typhoon ChipSet detected faults
  - TIG bus faults
  - RMC detected faults in DPR, I<sup>2</sup>C busses, etc.
  - Flash EEPROM corrupt or can't be loaded into memory

## Troubleshooting Facilities

- **RMC & Dual-Port RAM (DPR)**



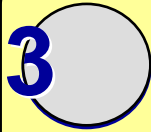
- ✓ CPU or system hard uncorrectable fault/error
- ✓ Able to run SRM or AlphaBIOS console, but can't reboot OS

## General Fault Classes

- **System console POST faults, such as:**
  - Hard memory 32 MB faults preventing OS boot
- **Double-error halt (DE-Halt) faults**

## Troubleshooting Facilities

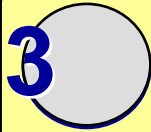
- **System console POST report out**
- **Dual-Port RAM (DPR)**
  - FRU EEPROM test directed diagnosis (TDD) area
- **Console “show flash” commands**



- ✓ CPU or system intermittent or hard uncorrectable error
- ✓ Can run SRM/AlphaBOIS console & reboot OS

## General Fault Classes

- Intermittent uncorrectable errors from Alpha-particles, environmental Emag, etc.
- Hard uncorrectable errors
  - CPU uncorrectables
  - System uncorrectables
    - PCI uncorrectables (target abort, NDS, etc.)
    - Memory UECC, or non-existent memory accesses
    - Environmentals ➡
      - Over-temperature failure
      - Non-redundant fan failures
      - PS voltage level failures wo/n or n+1
      - CPU Vterm/Vcore failures



- ✓ CPU or system intermittent or hard uncorrectable error
- ✓ Can run SRM/AlphaBOIS console & reboot OS

## General Fault Classes - Continued

- Intermittent uncorrectable errors from Alpha-particles, environmental Emag, etc.
- Hard uncorrectable errors
  - CPU uncorrectables
  - System uncorrectables

## Troubleshooting Facilities

- Crash dump analysis (OS dependent, use CANASTA-NG)
- Compaq Analyze
- Dual-Ported RAM (DPR)
  - System global error area 2D00 : 2DFF





- ✓ System or CPU correctable fault/error
- ✓ System operation is sustained

## General Fault Classes

### ■ CPU correctables

- Icache or Dcache single-bit ECC fill from Bcache fault
- Icache or Dcache single-bit ECC fill from memory fault
- Icache data or tag parity fault
- Dcache single-bit ECC on load, speculative load, small store
- Bcache victim read on Dcache/Bcache miss
- Bcache single-bit fault on probe hit

### ■ System correctables

- Pchip directed mapped or scatter/gather DMA single-bit ECC
- Environmentals:
  - Redundant fans (primary down, backup turned on)
  - N+1 PS (1 of 2 or 2 of 3 down) – system operation continues
  - Temperature warning



- ✓ System or CPU correctable fault/error
- ✓ System operation is sustained

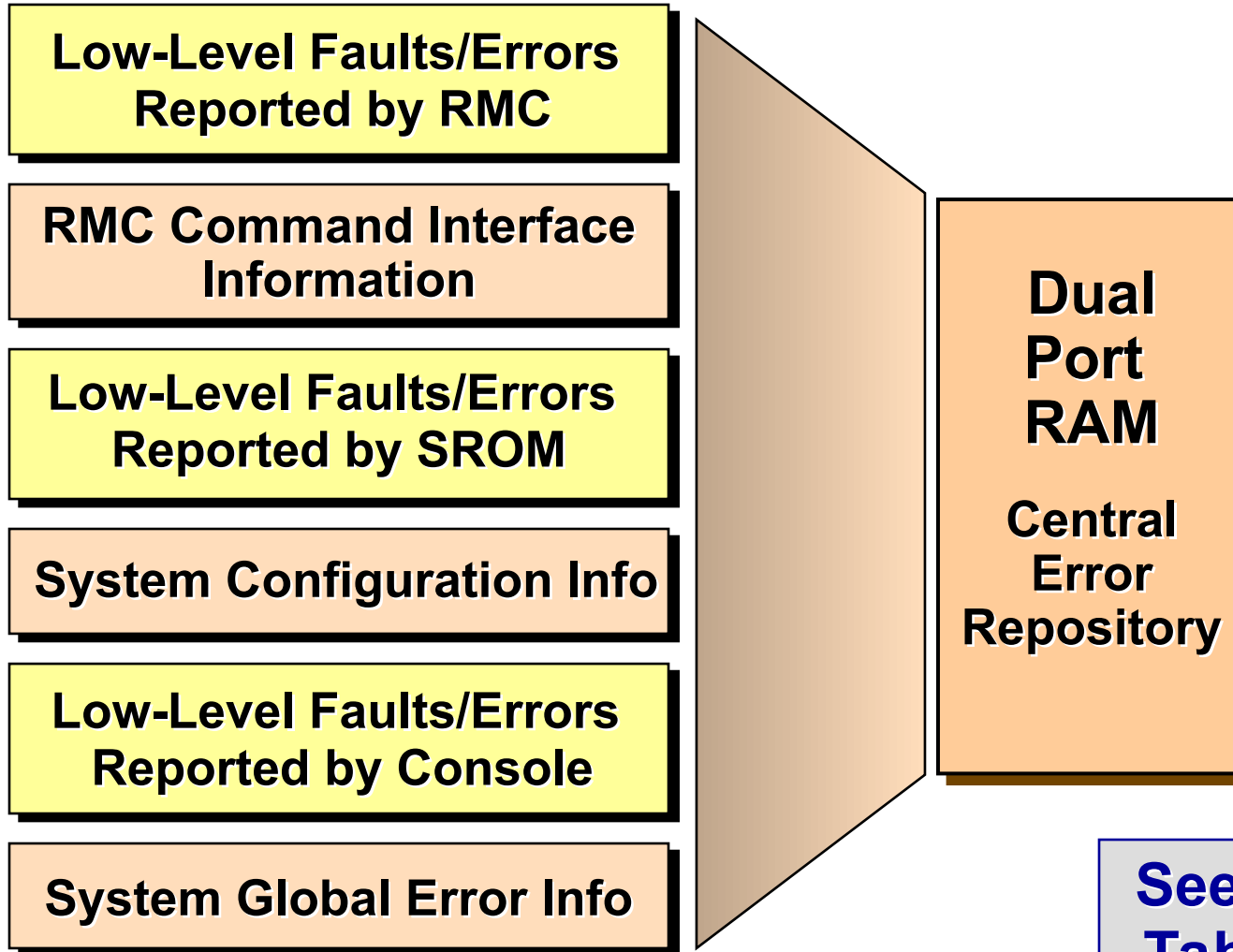
## General Fault Classes - Continued

- CPU correctables
- System correctables

## Troubleshooting Facilities

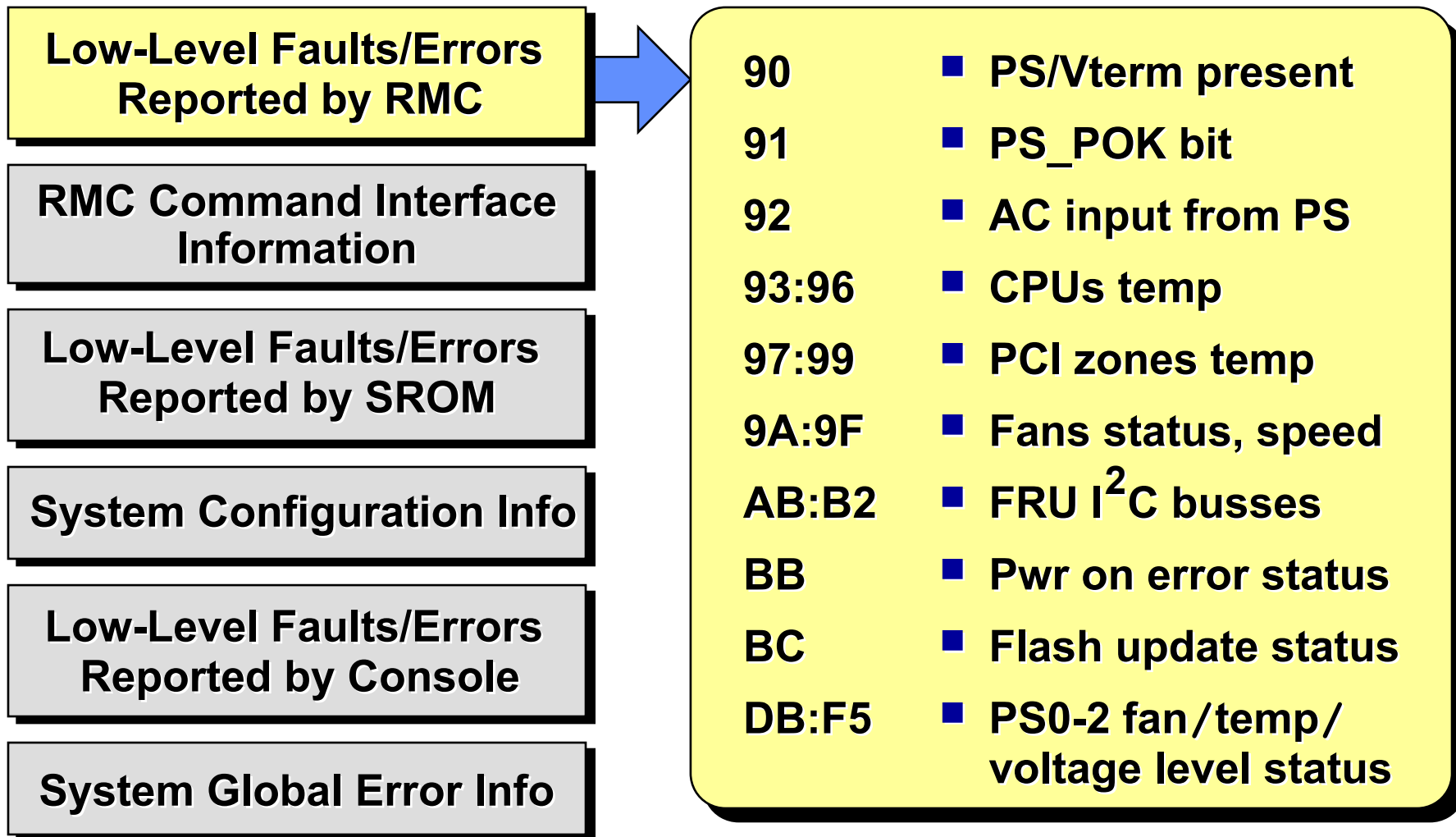
- Compaq Analyze  
filtering performed, OS throttling monitored
- Dual-Ported RAM
  - System global error area (2B00 : 2BFF or 2C00 : 2CFF)
- RMC Dual-Port RAM
  - FRU EEPROM SDD area

# DPR Structure & Content

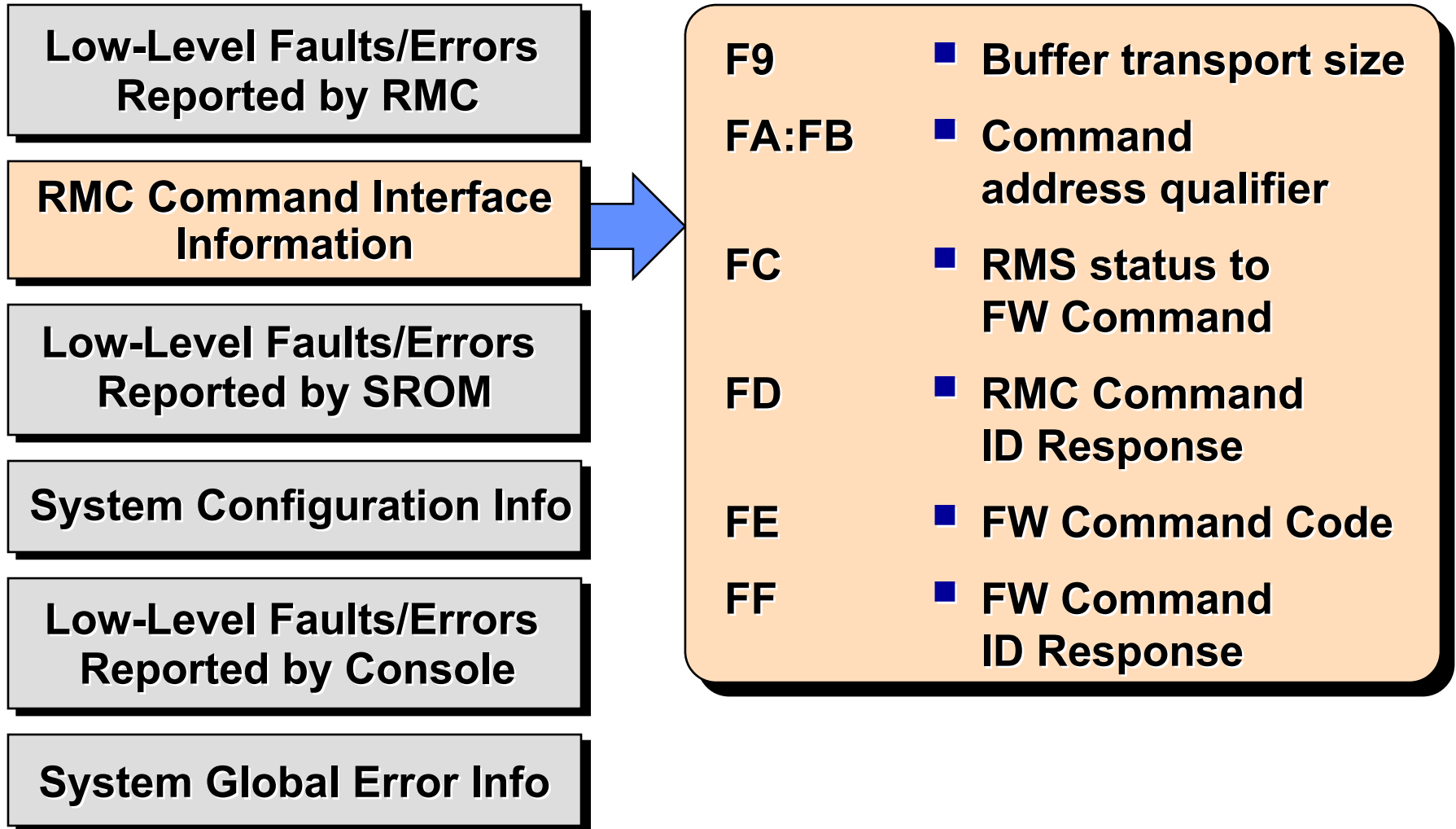


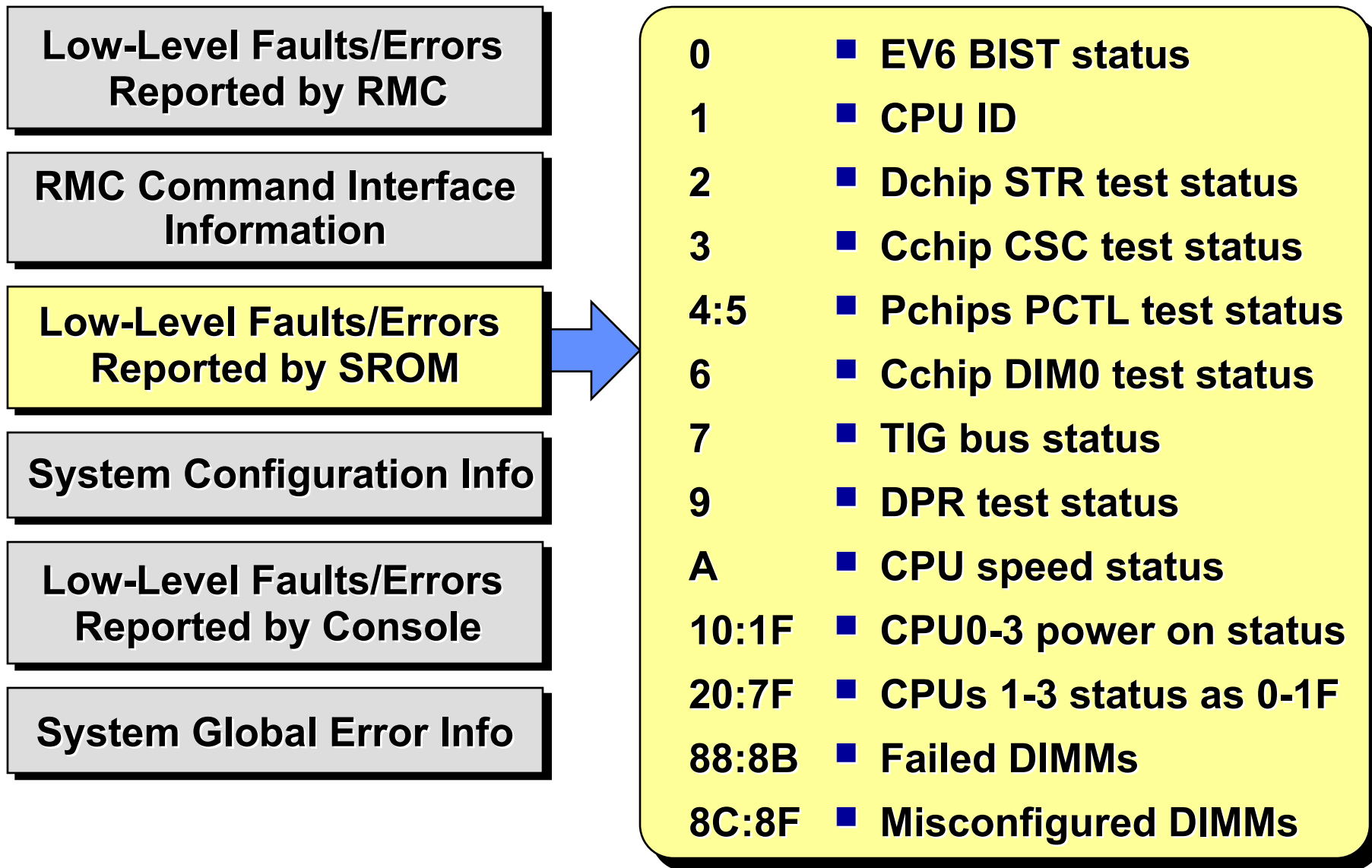
**See Regatta PFMS,  
Table 3, for details**

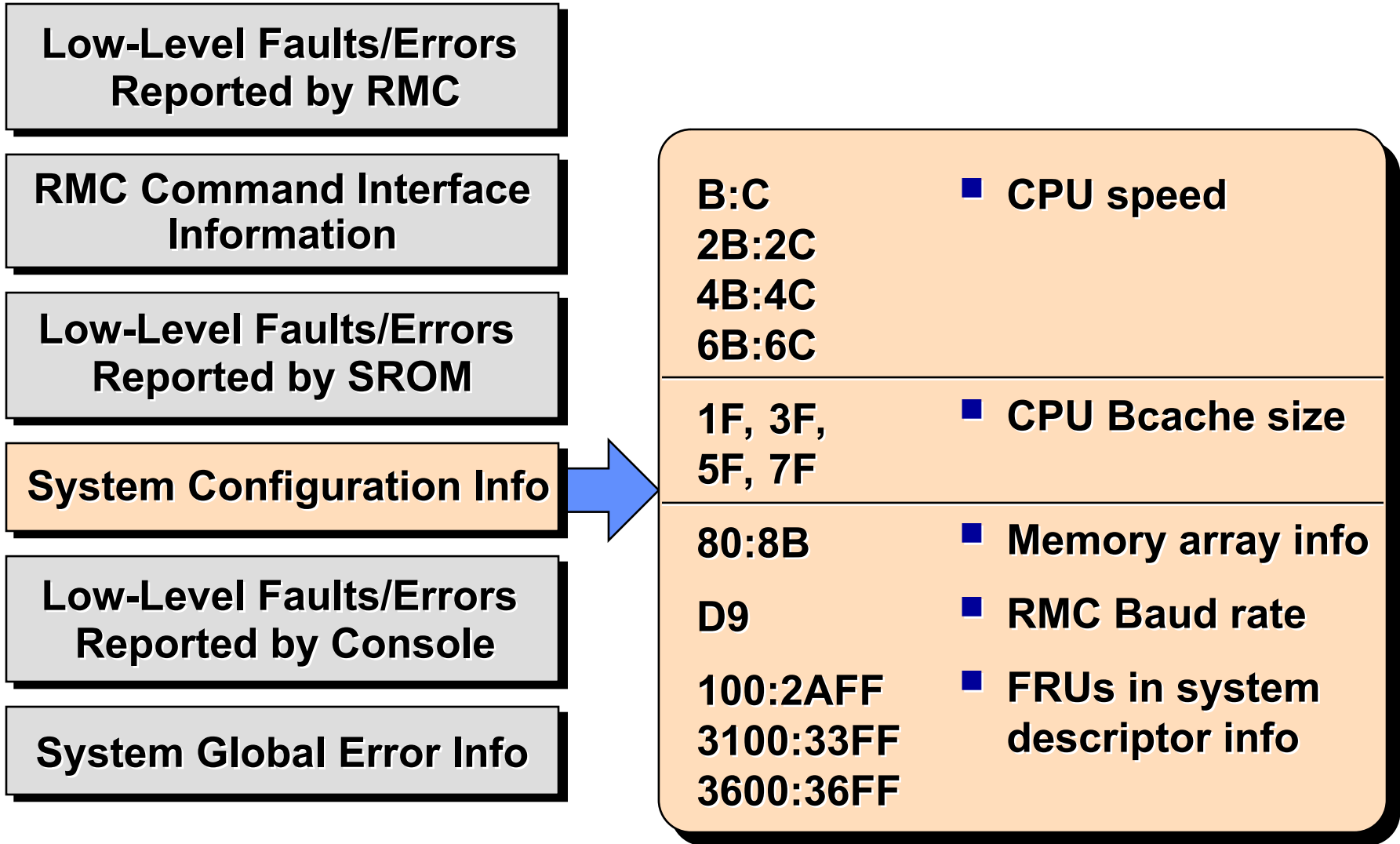
**<http://spdweb.eng.pko.dec.com/clipperteam>**

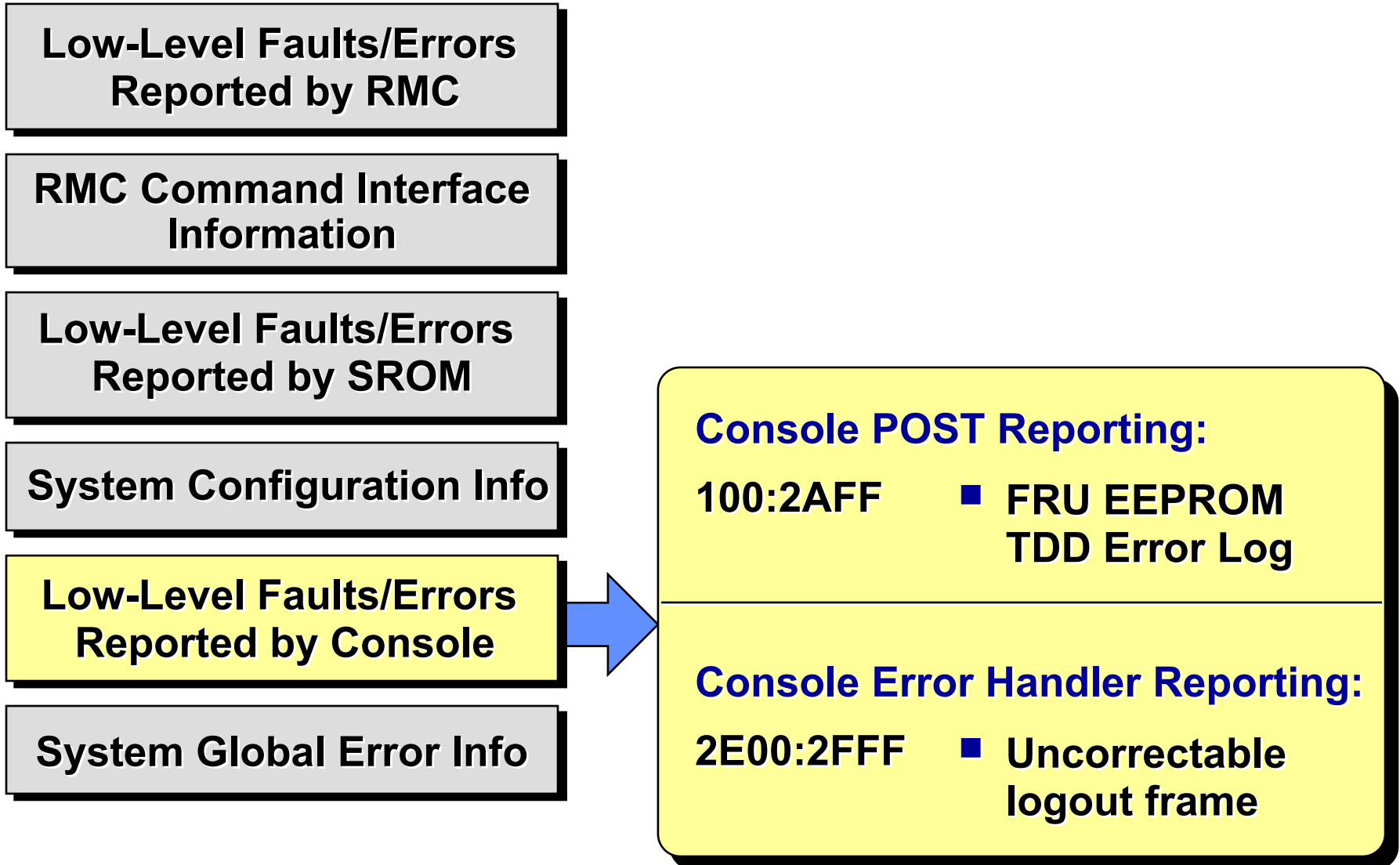


# DPR Structure & Content











Low-Level Faults/Errors  
Reported by RMC

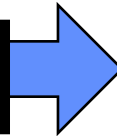
RMC Command Interface  
Information

Low-Level Faults/Errors  
Reported by SR0M

System Configuration Info

Low-Level Faults/Errors  
Reported by Console

System Global Error Info



## Compaq Analyze Reporting:

- 2B00:2BFF ■ Last System FRU Correctable Error
- 2C00:2CFF ■ Last System FRU Redundant Failure
- 2D00:2DFF ■ Last System FRU Failure
- 100:2AFF  
3100:33FF  
3600:36FF ■ FRU EEROM SDD encoded error log

## JEDEC Standard

**System Serial No.**

- System serial number
- SMM identifier code

**FRU Descriptor  
Data Structure**

- FRU manufacturer
- Model, part number & serial number

**Test Directed  
Diagnosis Log**

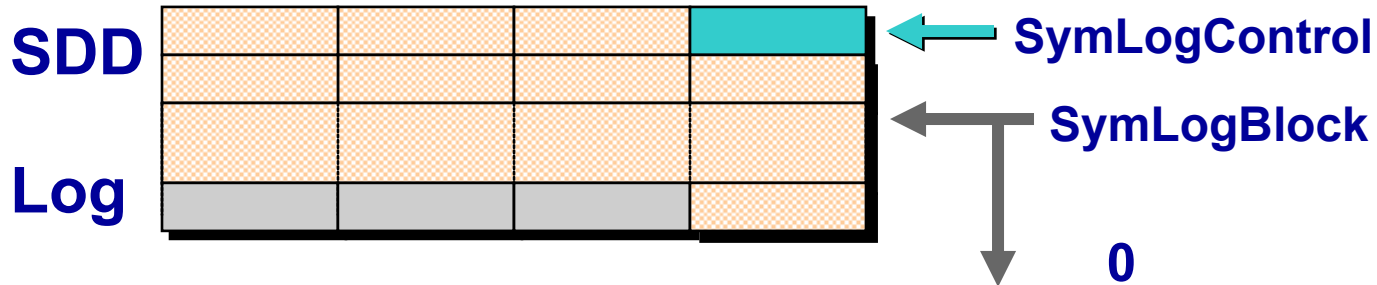
- Test failure info (type of diagnostic, failing subtest, failure code, etc.)
- Expected data and actual data

**Symptom  
Directed  
Diagnosis Log**

FRU fault isolation data generated by diagnostic SW (eg, Compaq Analyze)

256  
bytes

# Symptom Directed Diagnosis Log



ErrorCount	Rev	Length	
AppRevision		AppIDCode	OSType
OSRevision		Rule Revision	
Timestamp			
Begin FtlIsoThryCode			
End FtlIsoThryCode			
SDD FruErrorInfo			

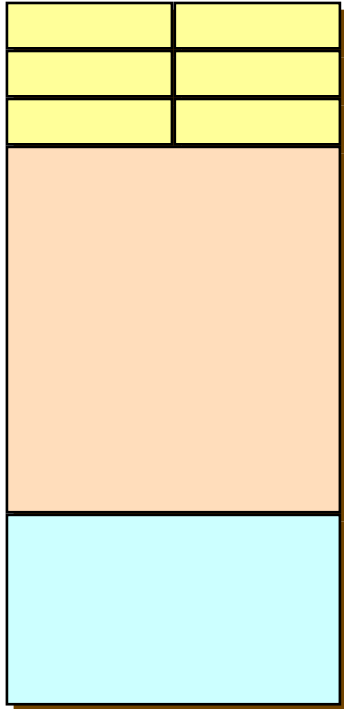
**SymLogBlock**  
(44 or 88 bytes)

See Regatta PFMS  
Tables 18 & 19

63	48 47	40 39	8 7	0
fault_isolation_code	err_code	prod_id	prod_type	

# Error Logout Frames

## Three Categories



1

**CPU or System Uncorrectable  
Mchk Error Logout Frame**

2

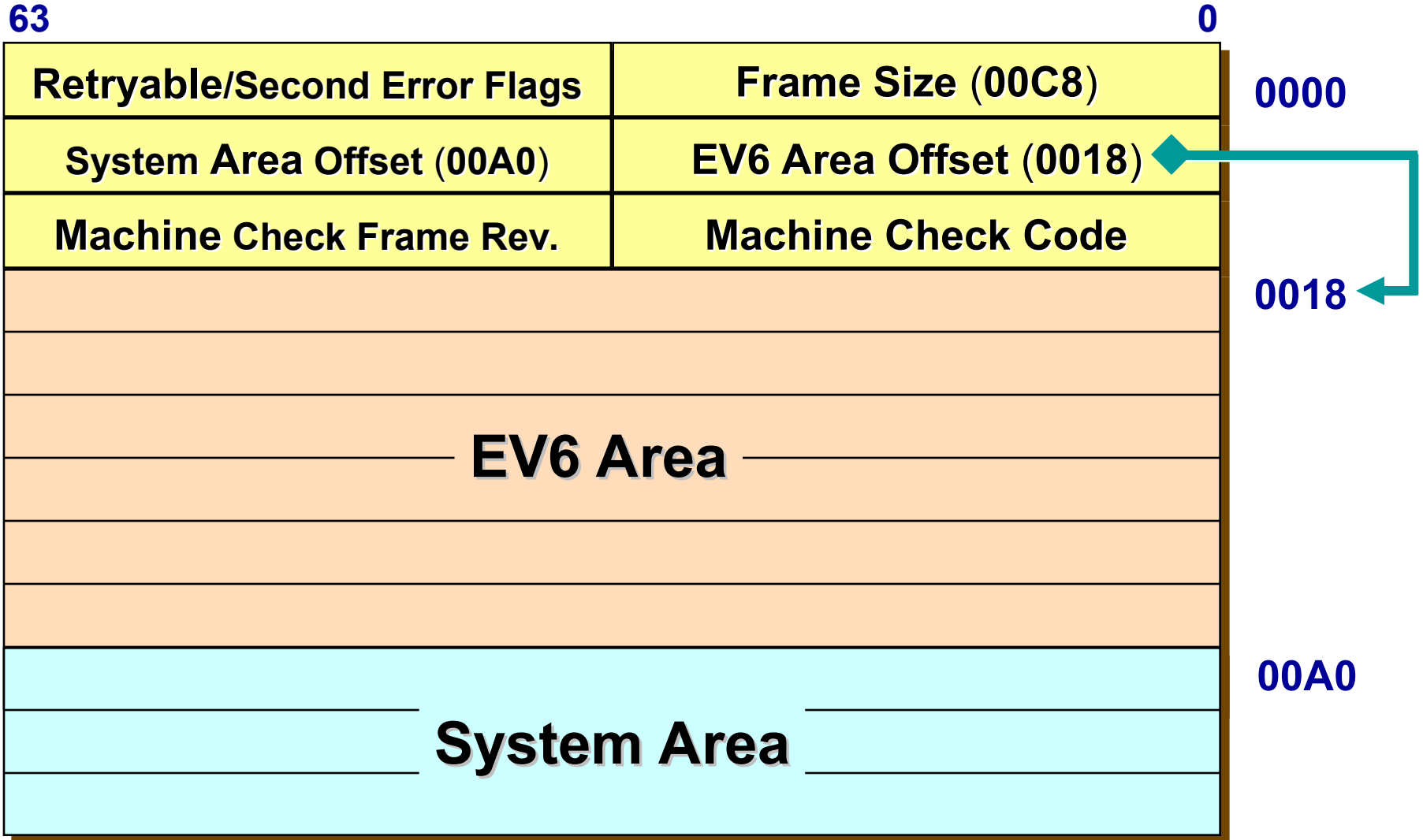
**CPU or System Correctable Error  
Logout Frame**

3

**Environmental Error  
Logout Frame**

# Error Logout Frames

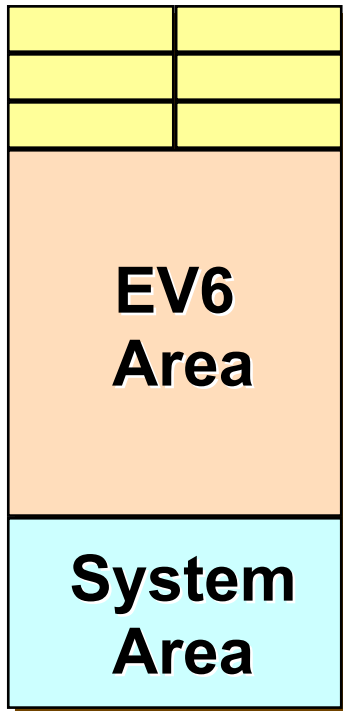
## CPU or System Uncorrectable Mchk



# Error Logout Frames

## CPU or System Uncorrectable Mchk

### Logout Frame



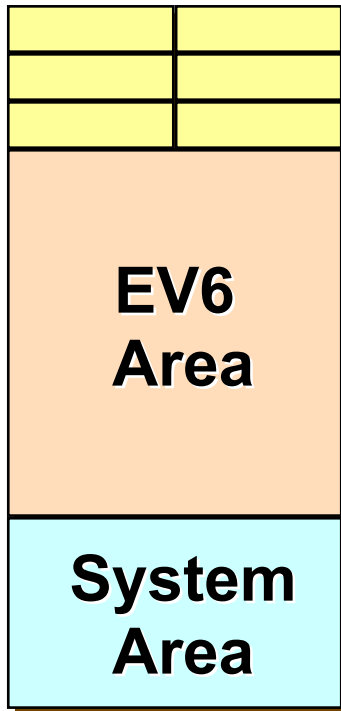
See Regatta PFMS  
Fig 2A & Table 5

EV6 Ibox Status (I_STAT)
EV6 Dcache Status (DC_STAT)
EV6 Cbox (C_ADDR)
EV6 Cbox (C_SYNDROME_1)
EV6 Cbox (C_SYNDROME_0)
EV6 Cbox (C_STAT)
EV6 Cbox (C_STS)
EV6 TB Miss or Fault Status (MM_STAT)
EV6 Exception Address (EXC_ADDR)
EV6 Interrupt Enablement & Current Processor Mode
EV6 Interrupt Summary Register (ISUM)
EV6 Reserved 0
EV6 PAL Base Address (PAL_BASE)
EV6 Ibox Control (I_CTL)
EV6 Ibox Process Context (PCTX)
EV6 Reserved 1
EV6 Reserved 2

# Error Logout Frames

## CPU or System Uncorrectable Mchk

### Logout Frame



See Regatta PFMS  
Fig 2A & Table 5

<b>Software Error Summary Flags</b>
<b>Cchip CPUx Device Interrupt Request Register</b> (DIRx System Primary CPU Fault Watcher)
<b>Cchip Miscellaneous Register (MISC)</b>
<b>Pchip 0 Error Register (PO_ERROR)</b>
<b>Pchip 1 Error Register (P1_ERROR)</b>

# Error Logout Frames

## CPU or System Correctable Error

<b>Retryable/Second Error Flags</b>	<b>Frame Size (0080)</b>	<b>0000</b>
<b>System Area Offset (0058)</b>	<b>EV6 Area Offset (0018)</b>	
<b>Machine Check Frame Rev.</b>	<b>Machine Check Code</b>	
<b>EV6 Ibox Status (I_STAT)</b>		<b>0018</b>
<b>EV6 Dcache Status (DC_STAT)</b>		
<b>EV6 Cbox (C_ADDR)</b>		
<b>EV6 Cbox (C_SYNDROME_1)</b>		<b>EV6 Area</b>
<b>EV6 Cbox (C_SYNDROME_0)</b>		
<b>EV6 Cbox (C_STAT)</b>		
<b>EV6 Cbox (C_STS)</b>		
<b>EV6 TB Miss or Fault Status (MM_STAT)</b>		
<b>Software Error Summary Flags</b>		<b>0058</b>
<b>Cchip CPUx Device Interrupt Request Register</b>		
<b>Cchip Miscellaneous Register (MISC)</b>		<b>System Area</b>
<b>Pchip 0 Error Register (P0_ERROR)</b>		
<b>Pchip 1 Error Register (P1_ERROR)</b>		

See Regatta  
PFMS Fig 2B &  
Table 5



# Error Logout Frames

## Environmental Error

<b>Retryable/Second Error Flags</b>	<b>Frame Size (0070)</b>
<b>System Area Offset (0018)</b>	<b>EV6 Area Offset (0018)</b>
<b>Machine Check Frame Rev.</b>	<b>Machine Check Code (206)</b>
<b>Software Error Summary Flags</b>	
<b>Cchip CPUx Device Interrupt Request Register</b>	
<b>TIG System Management Information Register (SMIR)</b>	
<b>TIG CPU Information Register (CPUIR)</b>	
<b>TIG Power Supply Information Register (PSIR)</b>	
<b>System PS/Temperature/Fan Fault (LM78_ISR)</b>	
<b>System Doors</b>	
<b>System Temperature Warning</b>	
<b>System Fan Control Fault</b>	
<b>Environmental Reserved 1</b>	
<b>Environmental Reserved 2</b>	

**0000**

**0018**

See Regatta  
PFMS Fig 2C &

Table 5

# Event Log Structure

## For Windows NT

63

0

<b>Standard Microsoft NT OS Header</b>
<b>New Common Event Header (CEH)</b>
<b>Standard Logout Frame Header</b>
<b>Common PAL EV6 Section</b>
<b>Common Regatta Tsunami/Typhoon Section</b>
<b>Platform-Specific OS Extended Tsunami/Typhoon Section</b>
<b>Platform-Specific OS Extended Error Log Capture Block</b>
<b>Error Event Termination Block Packet</b>

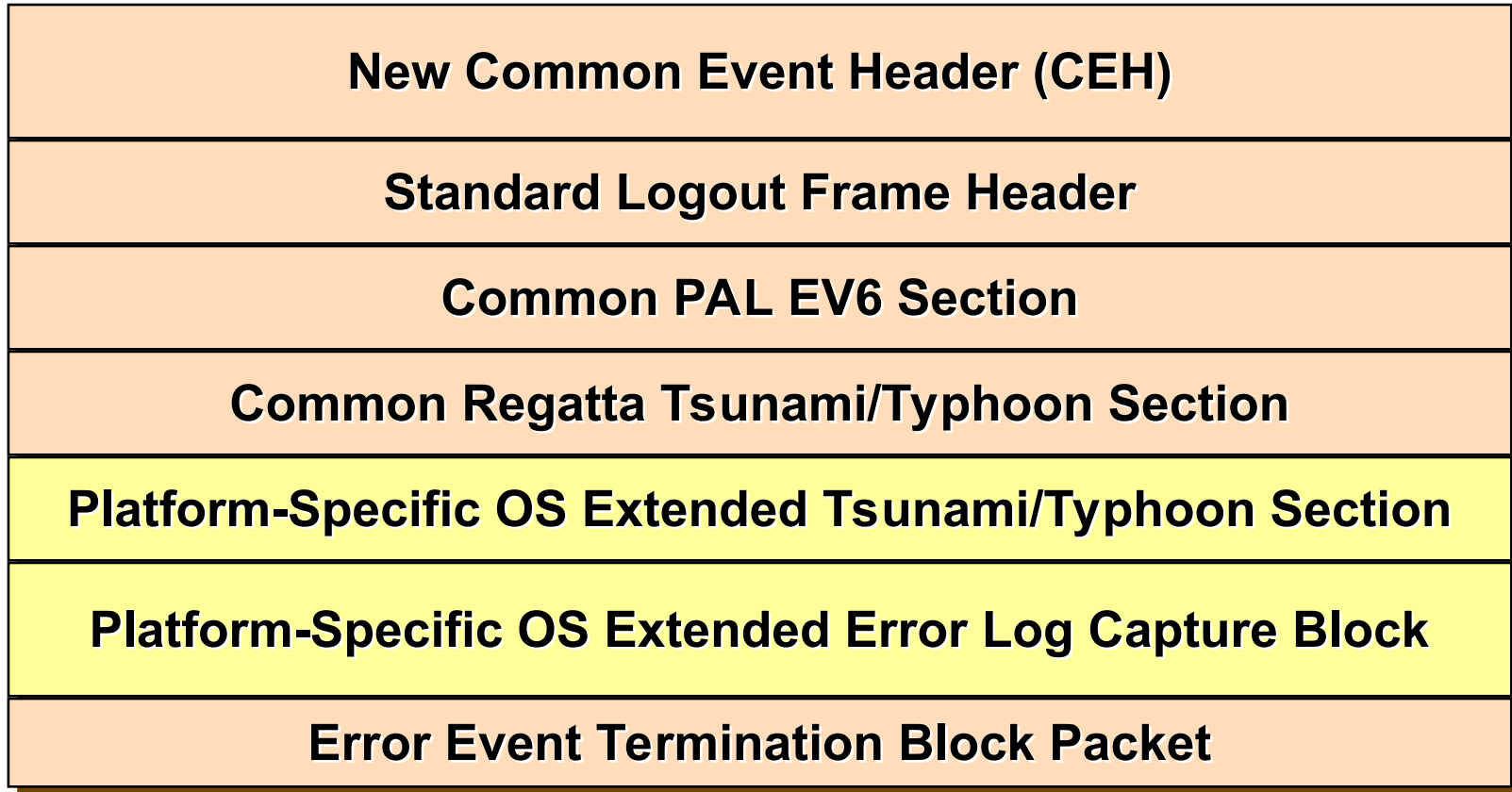
# Event Log Structure

---

## For UNIX and OpenVMS

63

0



# Event Log Structure

## Extended Tsunami/Typhoon Section

New Common Event Header (CEH)
Standard Logout Frame Header
Common PAL EV6 Section
Common Regatta Tsunami/Typhoon Section
Platform-Specific OS Extended Tsunami/Typhoon Section
Platform-Specific OS Extended Error Log Capture Block
Error Event Termination Block Packet

**Event Log  
Sections**



**Memory  
Packet  
Example**

63

0

packt_rev = 1	packt_type = 7	packt_class = 12	packt_length = 38
AAR0			
AAR1			
AAR2			
AAR3			
P0_PCTL			
P1_PCTL			


# Event Log Structure

## Extended Error Log Capture Block

New Common Event Header (CEH)
Standard Logout Frame Header
Common PAL EV6 Section
Common Regatta Tsunami/Typhoon Section
Platform-Specific OS Extended Tsunami/Typhoon Section
Platform-Specific OS Extended Error Log Capture Block
Error Event Termination Block Packet

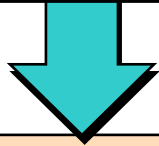
**Event Log  
Sections**

**Memory  
Packet  
Example**



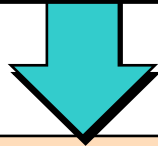
31				0	
packt_class = 12		packt_rev = 1		packt_length = 10	
				packt_type = 4	
Array 1 Size →	DPR (83)	DPR (82)	DPR (81)	DPR (80)	
Array 3 Size →	DPR (87)	DPR (86)	DPR (85)	DPR (84)	

**Knowledge Capture Tool (KCT)**



**CLIPS Text Code**

**DeCOR Format Utility**



**CLIPS Binary Code \*.KRS**

**CA GUI Knowledge Registration**

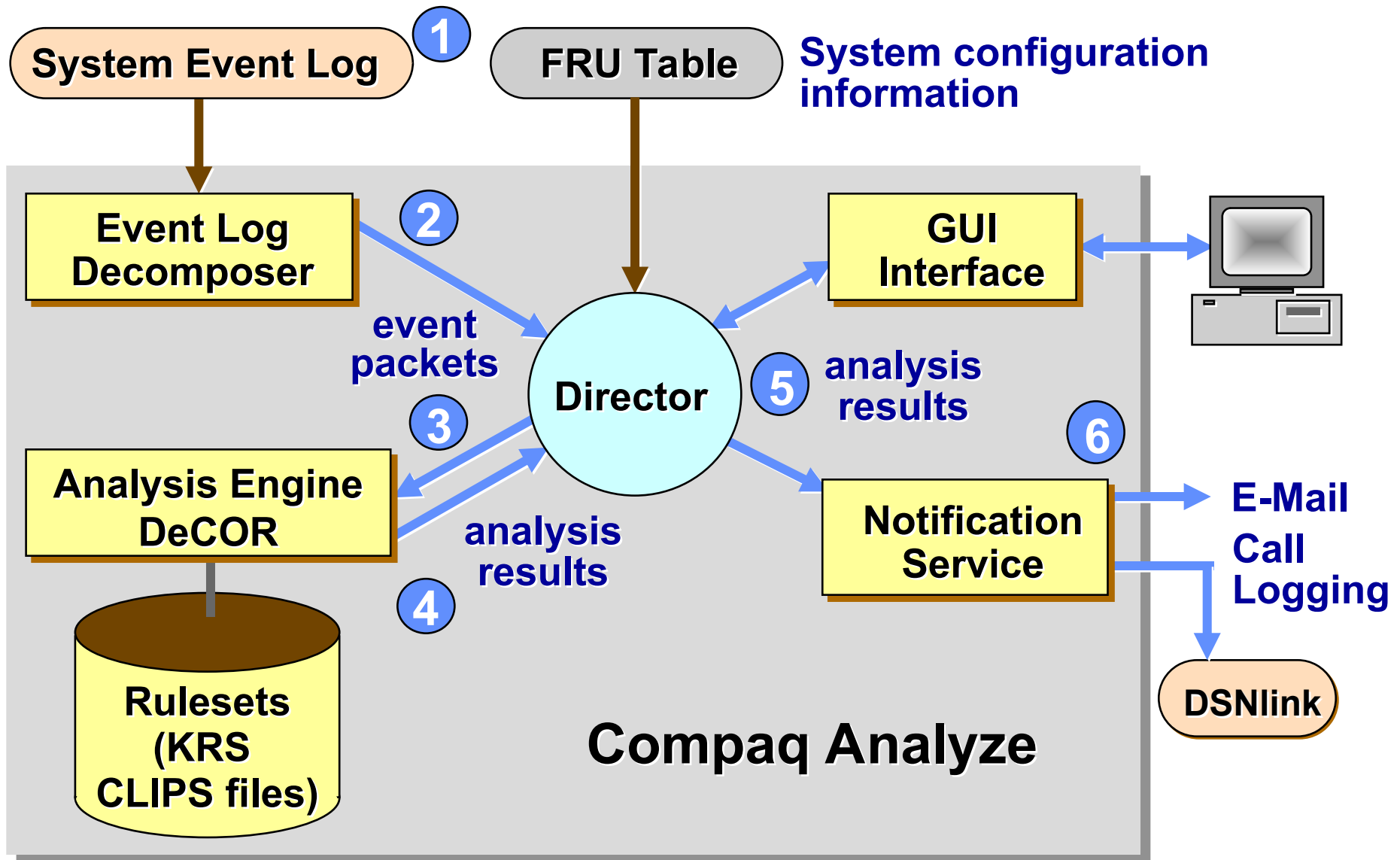
**RegisterKnowledge**

**Ruleset:**  
/usr/users/kenney/DA/rules/filename.krs

**Path Info:**

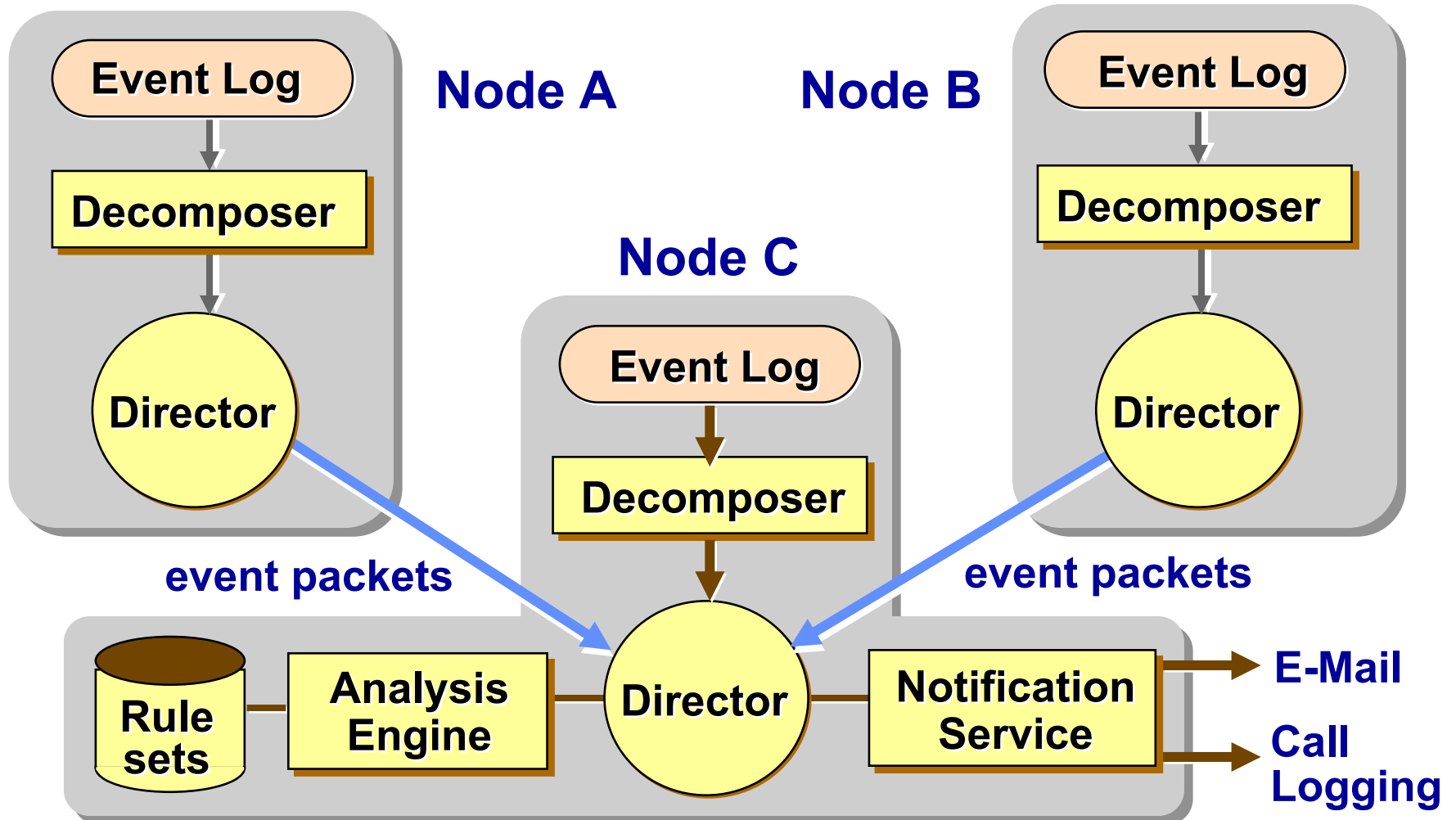
**Ok**    **Cancel**    **Clear Information from Clipboard**

# Compaq Analyze Components



# CA Enterprise Model

## Supported in Later Release





## Automatic Analysis

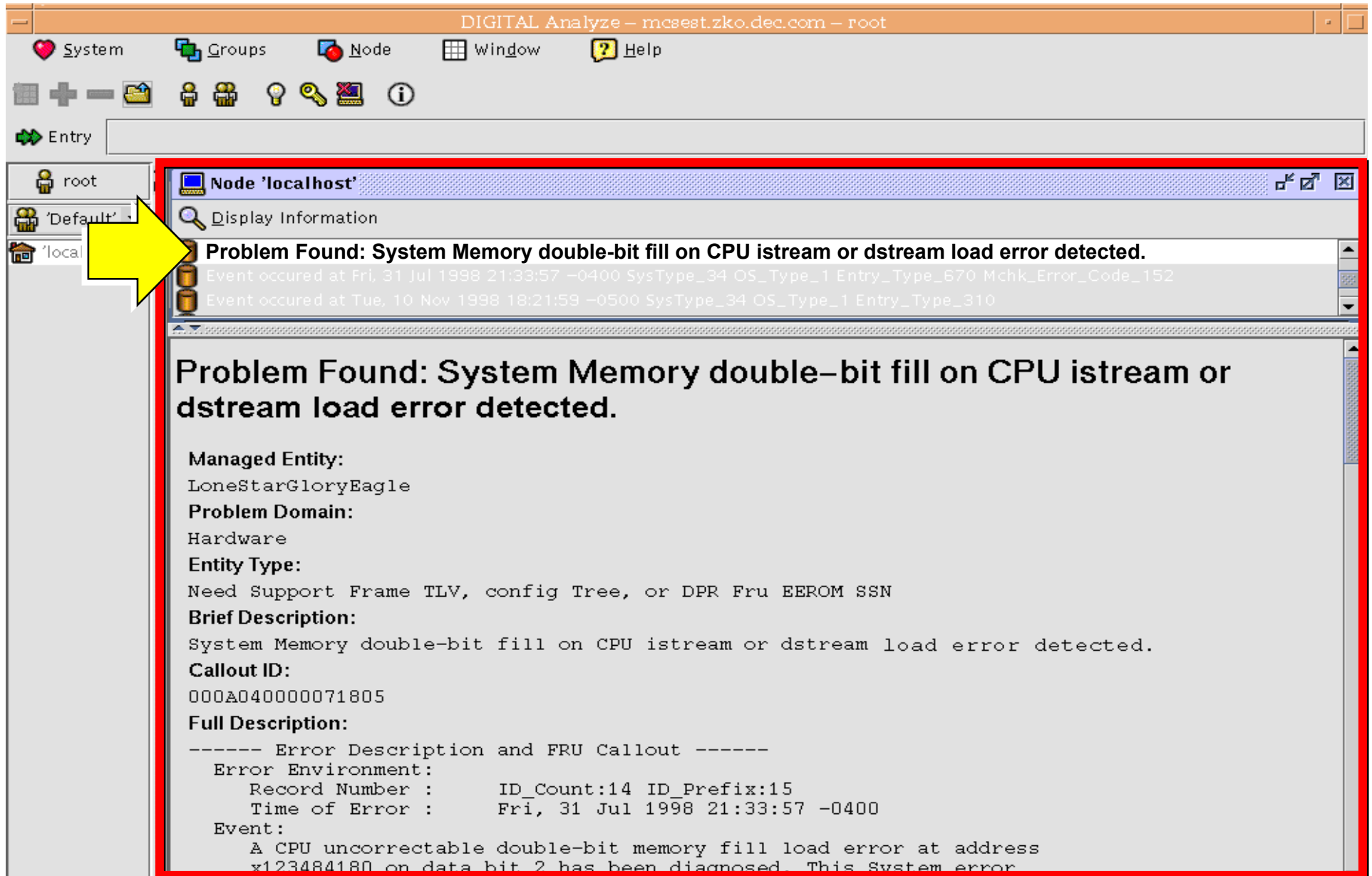
(Supported Now)

- Continuous monitoring of system event log
- Analysis triggered by single or multiple events
- Event problem report(s) may be generated when an analysis rule fires
- Notification occurs via mailing list and SICL

## Manual Analysis

(Available in Later Release)

- User supplies the file and starts the analysis
- Event log can be from same system or a different system
- Notification is not performed
- Problem reports are generated



DIGITAL Analyze – mcsest.zko.dec.com – root

System Groups Node Window Help

Entry

root

'Default'

'local'

**Node 'localhost'**

Display Information

**Problem Found: System Memory double-bit fill on CPU istream or dstream load error detected.**

Event occurred at Fri, 31 Jul 1998 21:33:57 -0400 SysType\_34 OS\_Type\_1 Entry\_Type\_670 Mchk\_Error\_Code\_152

Event occurred at Tue, 10 Nov 1998 18:21:59 -0500 SysType\_34 OS\_Type\_1 Entry\_Type\_310

**Problem Found: System Memory double-bit fill on CPU istream or dstream load error detected.**

**Managed Entity:**  
LoneStarGloryEagle

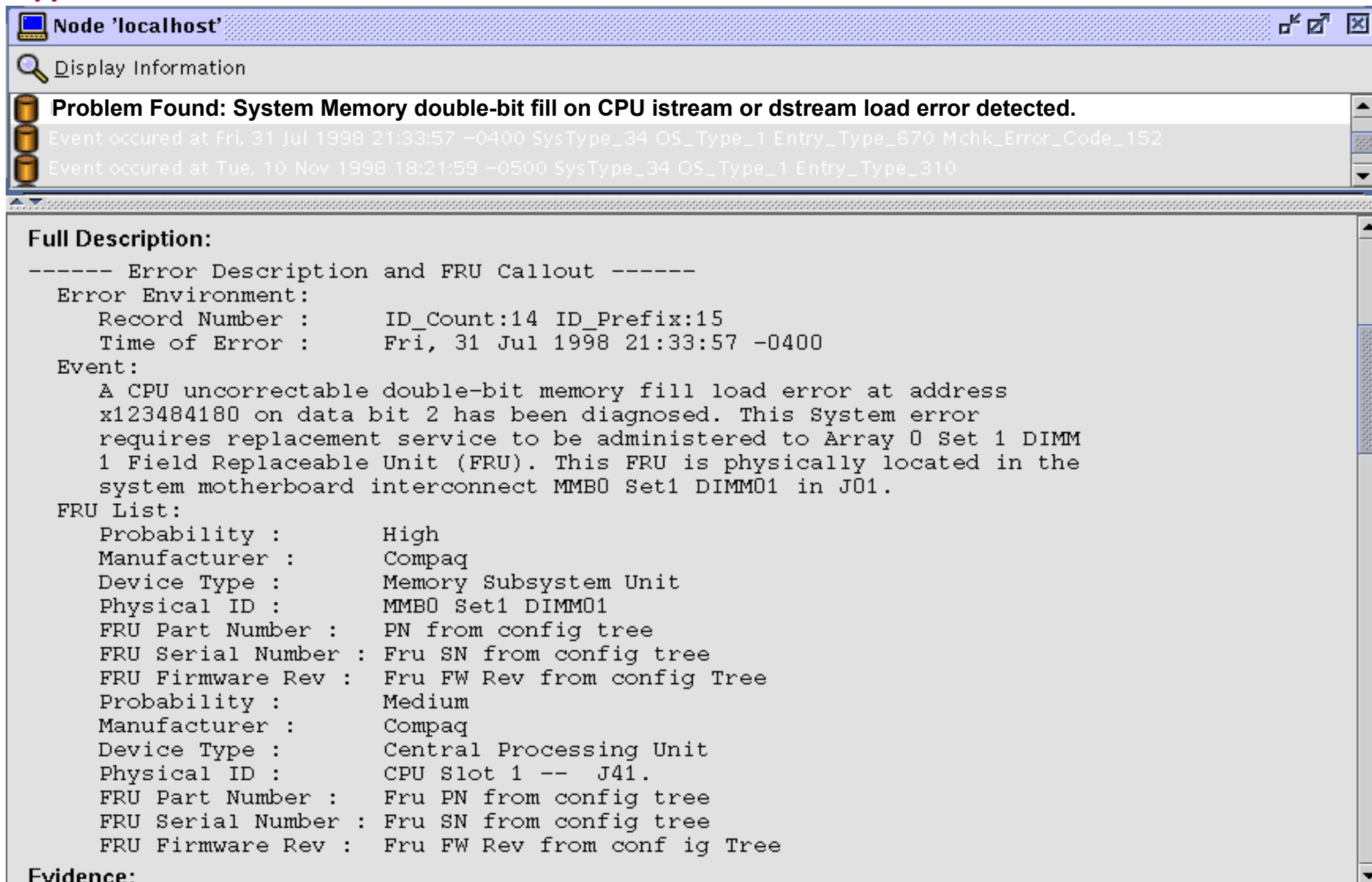
**Problem Domain:**  
Hardware

**Entity Type:**  
Need Support Frame TLV, config Tree, or DPR Fru EEROM SSN

**Brief Description:**  
System Memory double-bit fill on CPU istream or dstream load error detected.

**Callout ID:**  
000A040000071805

**Full Description:**  
----- Error Description and FRU Callout -----  
Error Environment:  
Record Number : ID\_Count:14 ID\_Prefix:15  
Time of Error : Fri, 31 Jul 1998 21:33:57 -0400  
Event:  
A CPU uncorrectable double-bit memory fill load error at address  
x123484180 on data bit 2 has been diagnosed. This System error



The screenshot shows a window titled "Node 'localhost'" with a search icon and the text "Display Information". Below this, a yellow banner displays the error: "Problem Found: System Memory double-bit fill on CPU istream or dstream load error detected." Two event logs follow: "Event occurred at Fri, 31 Jul 1998 21:33:57 -0400 SysType\_34 OS\_Type\_1 Entry\_Type\_670 Mchk\_Error\_Code\_152" and "Event occurred at Tue, 10 Nov 1998 18:21:59 -0500 SysType\_34 OS\_Type\_1 Entry\_Type\_310". The main area is titled "Full Description:" and contains a detailed error report.

**Full Description:**

----- Error Description and FRU Callout -----

Error Environment:

Record Number : ID\_Count:14 ID\_Prefix:15

Time of Error : Fri, 31 Jul 1998 21:33:57 -0400

Event:

A CPU uncorrectable double-bit memory fill load error at address x123484180 on data bit 2 has been diagnosed. This System error requires replacement service to be administered to Array 0 Set 1 DIMM 1 Field Replaceable Unit (FRU). This FRU is physically located in the system motherboard interconnect MMB0 Set1 DIMM01 in J01.

FRU List:

Probability : High

Manufacturer : Compaq

Device Type : Memory Subsystem Unit

Physical ID : MMB0 Set1 DIMM01

FRU Part Number : PN from config tree

FRU Serial Number : Fru SN from config tree

FRU Firmware Rev : Fru FW Rev from config Tree

Probability : Medium

Manufacturer : Compaq

Device Type : Central Processing Unit

Physical ID : CPU Slot 1 -- J41.

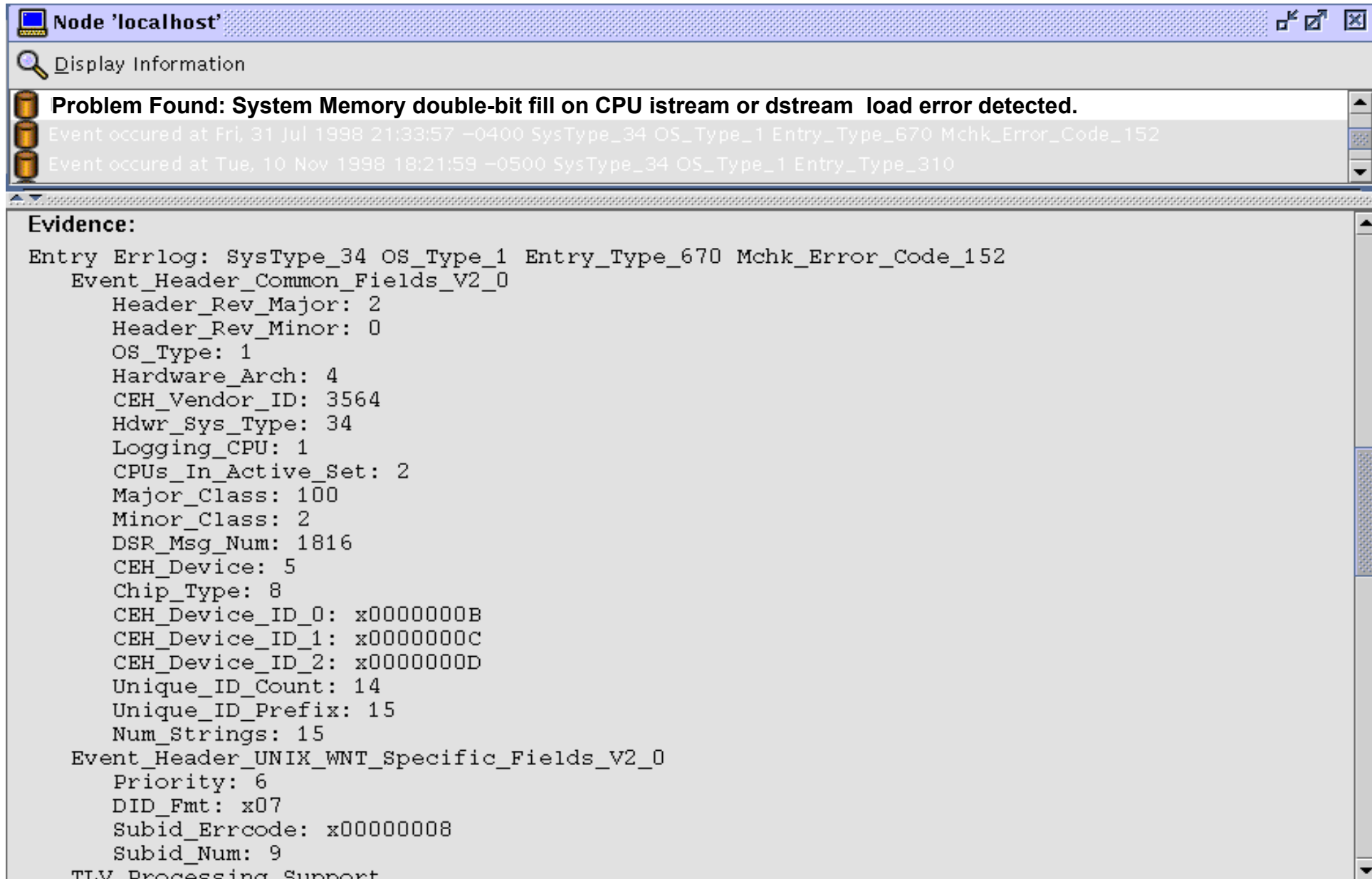
FRU Part Number : Fru PN from config tree

FRU Serial Number : Fru SN from config tree

FRU Firmware Rev : Fru FW Rev from config Tree

**Evidence:**

# FRU Callout Example - Evidence



The screenshot shows a window titled "Node 'localhost'" with a search icon and the text "Display Information". Below this, a message states: "Problem Found: System Memory double-bit fill on CPU istream or dstream load error detected." Two event logs are listed: one from Fri, 31 Jul 1998 21:33:57 -0400 with SysType\_34, OS\_Type\_1, Entry\_Type\_670, and Mchk\_Error\_Code\_152; and another from Tue, 10 Nov 1998 18:21:59 -0500 with SysType\_34, OS\_Type\_1, and Entry\_Type\_310. The "Evidence:" section contains a detailed log entry for the first event, listing various fields such as Header\_Rev\_Major, OS\_Type, Hardware\_Arch, CEH\_Vendor\_ID, Hdwr\_Sys\_Type, Logging\_CPU, CPUs\_In\_Active\_Set, Major\_Class, Minor\_Class, DSR\_Msg\_Num, CEH\_Device, Chip\_Type, CEH\_Device\_ID\_0, CEH\_Device\_ID\_1, CEH\_Device\_ID\_2, Unique\_ID\_Count, Unique\_ID\_Prefix, Num\_Strings, Event\_Header\_UNIX\_WNT\_Specific\_Fields\_V2\_0, Priority, DID\_Fmt, Subid\_Errcode, and Subid\_Num. The window also shows a "TLV Processing Support" message at the bottom.

Node 'localhost'

Display Information

**Problem Found: System Memory double-bit fill on CPU istream or dstream load error detected.**

Event occurred at Fri, 31 Jul 1998 21:33:57 -0400 SysType\_34 OS\_Type\_1 Entry\_Type\_670 Mchk\_Error\_Code\_152

Event occurred at Tue, 10 Nov 1998 18:21:59 -0500 SysType\_34 OS\_Type\_1 Entry\_Type\_310

**Evidence:**

Entry Errlog: SysType\_34 OS\_Type\_1 Entry\_Type\_670 Mchk\_Error\_Code\_152

Event\_Header\_Common\_Fields\_V2\_0

Header\_Rev\_Major: 2

Header\_Rev\_Minor: 0

OS\_Type: 1

Hardware\_Arch: 4

CEH\_Vendor\_ID: 3564

Hdwr\_Sys\_Type: 34

Logging\_CPU: 1

CPUs\_In\_Active\_Set: 2

Major\_Class: 100

Minor\_Class: 2

DSR\_Msg\_Num: 1816

CEH\_Device: 5

Chip\_Type: 8

CEH\_Device\_ID\_0: x0000000B

CEH\_Device\_ID\_1: x0000000C

CEH\_Device\_ID\_2: x0000000D

Unique\_ID\_Count: 14

Unique\_ID\_Prefix: 15

Num\_Strings: 15

Event\_Header\_UNIX\_WNT\_Specific\_Fields\_V2\_0

Priority: 6

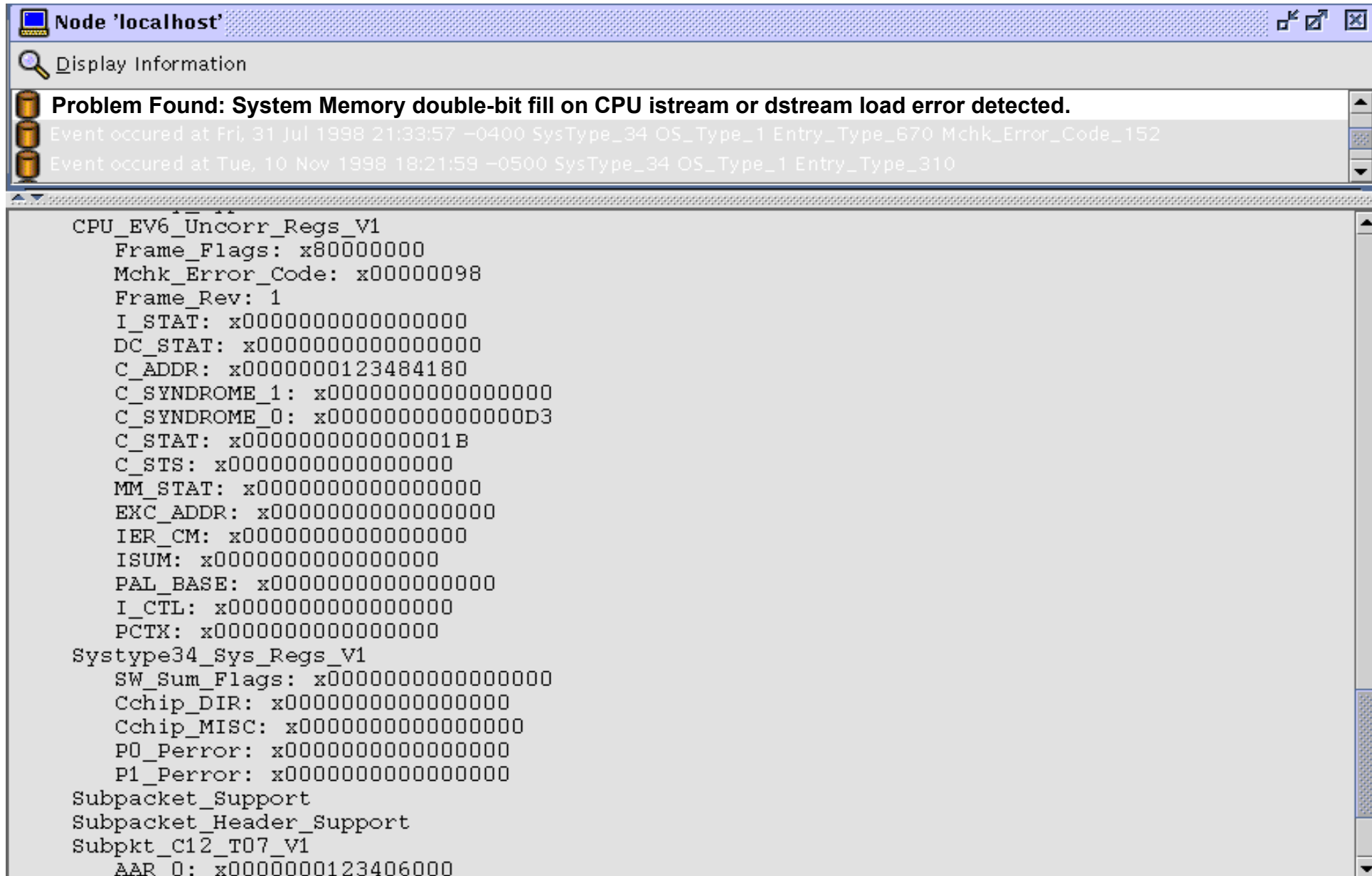
DID\_Fmt: x07

Subid\_Errcode: x00000008

Subid\_Num: 9

TLV Processing Support

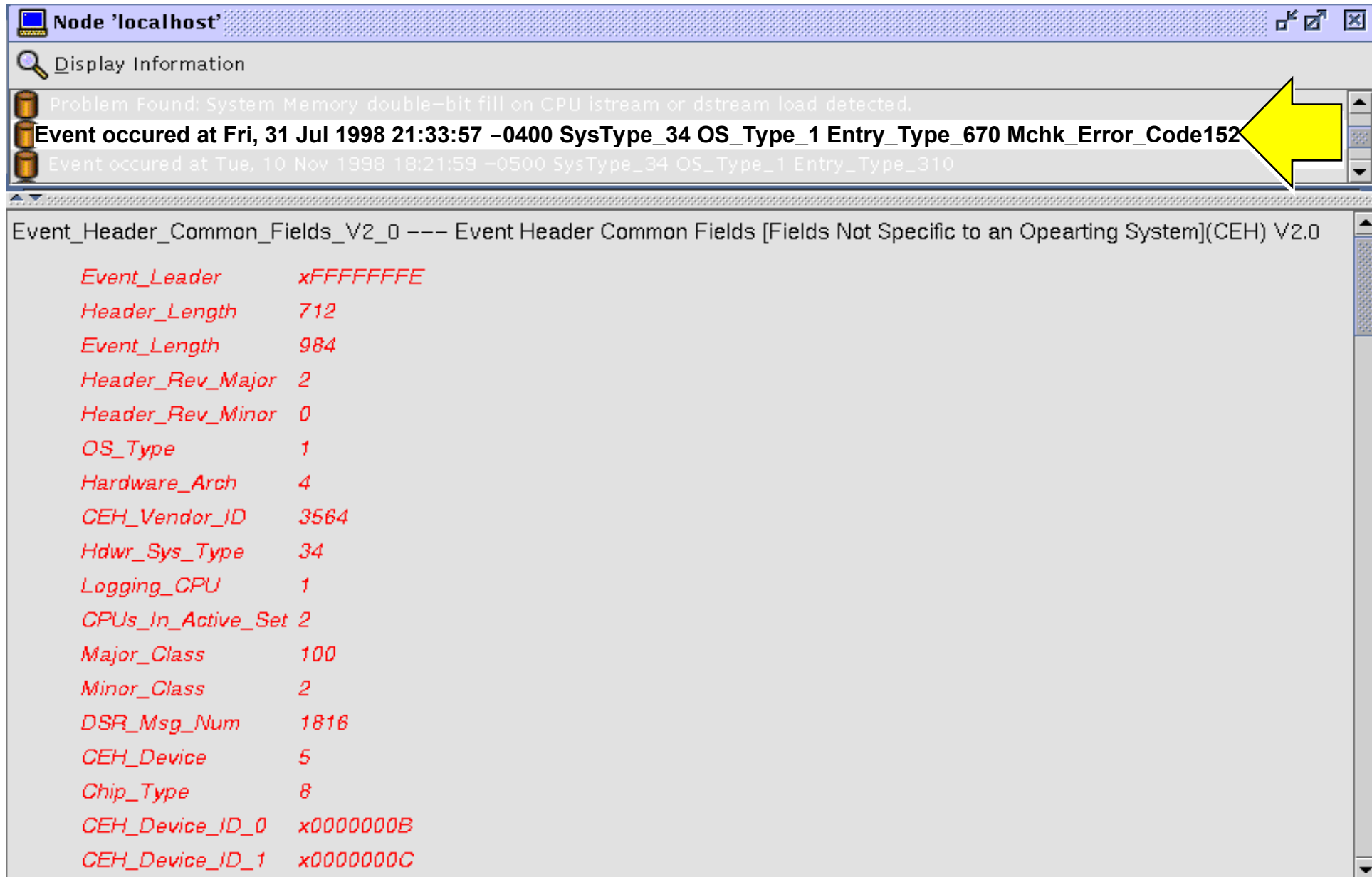
# FRU Callout Example - Evidence



The screenshot shows a window titled "Node 'localhost'" with a search icon and the text "Display Information". Below this, a message box states: "Problem Found: System Memory double-bit fill on CPU istream or dstream load error detected." Two event logs are listed: "Event occurred at Fri, 31 Jul 1998 21:33:57 -0400 SysType\_34 OS\_Type\_1 Entry\_Type\_670 Mchk\_Error\_Code\_152" and "Event occurred at Tue, 10 Nov 1998 18:21:59 -0500 SysType\_34 OS\_Type\_1 Entry\_Type\_310". The main content area displays a list of system registers and their values in hexadecimal.

```
CPU_EV6_Uncorr_Regs_V1
  Frame_Flags: x80000000
  Mchk_Error_Code: x00000098
  Frame_Rev: 1
  I_STAT: x0000000000000000
  DC_STAT: x0000000000000000
  C_ADDR: x0000000123484180
  C_SYNDROME_1: x0000000000000000
  C_SYNDROME_0: x00000000000000D3
  C_STAT: x000000000000001B
  C_STS: x0000000000000000
  MM_STAT: x0000000000000000
  EXC_ADDR: x0000000000000000
  IER_CM: x0000000000000000
  ISUM: x0000000000000000
  PAL_BASE: x0000000000000000
  I_CTL: x0000000000000000
  PCTX: x0000000000000000
Systype34_Sys_Regs_V1
  SW_Sum_Flags: x0000000000000000
  Cchip_DIR: x0000000000000000
  Cchip_MISC: x0000000000000000
  P0_Perror: x0000000000000000
  P1_Perror: x0000000000000000
Subpacket_Support
Subpacket_Header_Support
Subpkt_C12_T07_V1
  AAR_0: x0000000123406000
```

# Hex Dump Example



Node 'localhost'

Display Information

Problem Found: System Memory double-bit fill on CPU istream or dstream load detected.

Event occurred at Fri, 31 Jul 1998 21:33:57 -0400 SysType\_34 OS\_Type\_1 Entry\_Type\_670 Mchk\_Error\_Code152

Event occurred at Tue, 10 Nov 1998 18:21:59 -0500 SysType\_34 OS\_Type\_1 Entry\_Type\_310

Event\_Header\_Common\_Fields\_V2\_0 --- Event Header Common Fields [Fields Not Specific to an Operating System](CEH) V2.0

Event_Leader	xFFFFFFFFE
Header_Length	712
Event_Length	984
Header_Rev_Major	2
Header_Rev_Minor	0
OS_Type	1
Hardware_Arch	4
CEH_Vendor_ID	3564
Hdwr_Sys_Type	34
Logging_CPU	1
CPUs_In_Active_Set	2
Major_Class	100
Minor_Class	2
DSR_Msg_Num	1816
CEH_Device	5
Chip_Type	8
CEH_Device_ID_0	x0000000B
CEH_Device_ID_1	x0000000C

# Hex Dump Example - continued

Node 'localhost'

Display Information

Problem Found: System Memory double-bit fill on CPU istream or dstream load detected.

**Event occurred at Fri, 31 Jul 1998 21:33:57 -0400 SysType\_34 OS\_Type\_1 Entry\_Type\_670 Mchk\_Error\_Code152**

Event occurred at Tue, 10 Nov 1998 18:21:59 -0500 SysType\_34 OS\_Type\_1 Entry\_Type\_310

---

Event\_Header\_UNIX\_WNT\_Specific\_Fields\_V2\_0 --- Event Header UNIX/WNT Specific Fields (CEH) V2.0

*\*\*\* UNIX SPECIFIC FIELDS In UNIX Common Event Header \*\*\**

Priority	6
DID_Fmt	x07
Subid_Errcode	x00000008
Subid_Num	9

TLV\_Processing\_Support --- Common TLV Processing, Decomposer Support Class

*\*\*\* START 15 TLV(s) In Common Event Header \*\*\**

TLV_Time_js_ISO_Std_8601	19980731223357,00-0400
TLV_Time_as_Local	Fri, 31 Jul 1998 21:33:57 -0400
TLV_Undefined	Undefined
TLV_Unused	Unused
TLV_DSR_String	DSR Here
TLV_OS_Version	Oper System Ver Here
TLV_OS_Build_Num	Op Sys Build Num Here
TLV_Sys_Serial_Num	Sys Serial Num Here
TLV_DDR_String	DDR
TLV_Patch_Level	Patch Level

# Hex Dump Example - continued

Node 'localhost'

Display Information

Problem Found: System Memory double-bit fill on CPU istream or dstream load detected.

**Event occurred at Fri, 31 Jul 1998 21:33:57 -0400 SysType\_34 OS\_Type\_1 Entry\_Type\_670 Mchk\_Error\_Code152**

Event occurred at Tue, 10 Nov 1998 18:21:59 -0500 SysType\_34 OS\_Type\_1 Entry\_Type\_310

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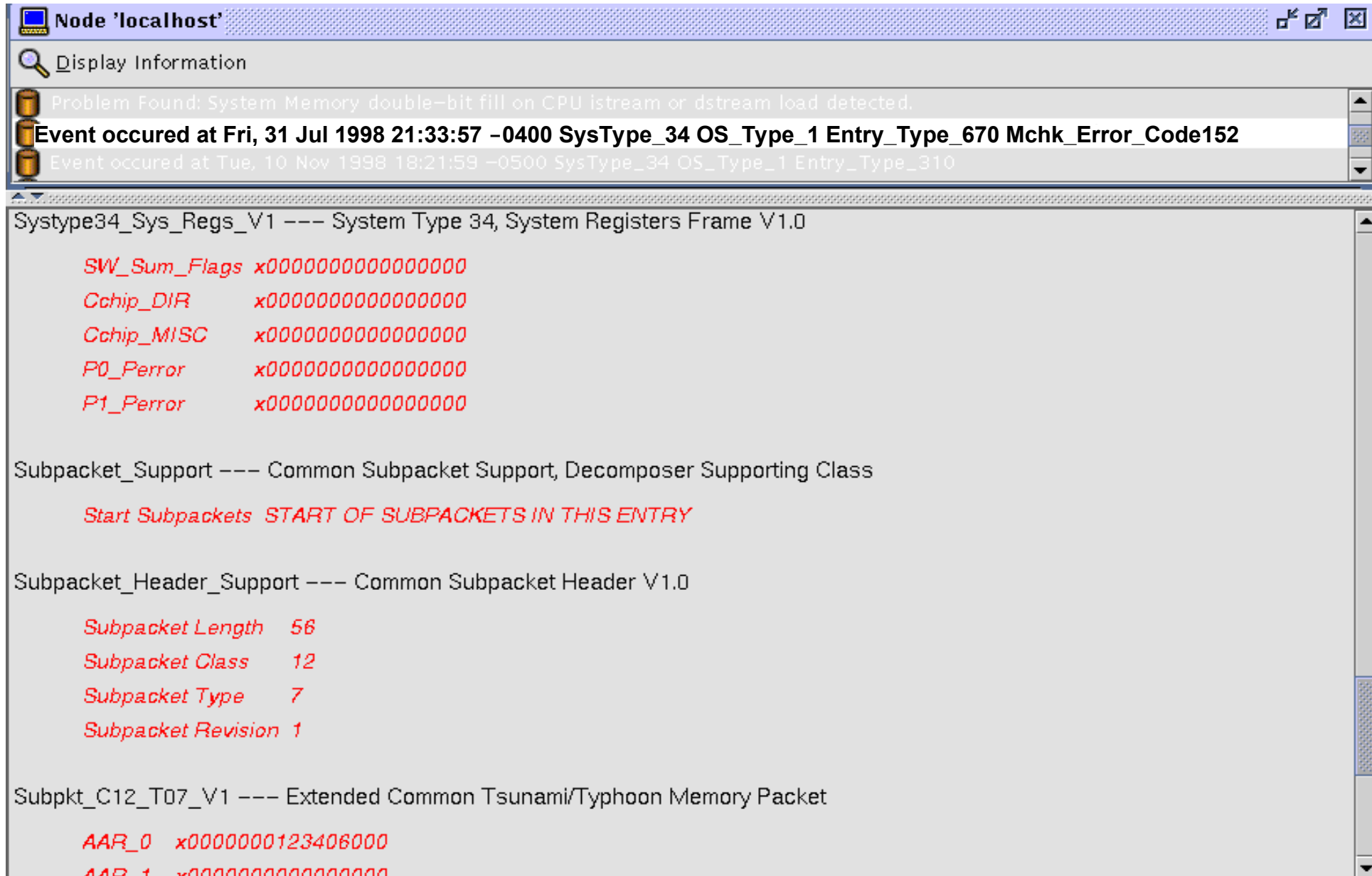
Entry\_Type\_Support --- Entry Type Support. Canonicalization Decomposer Supporting Class

*Entry\_Type 670*

CPU\_EV6\_Uncorr\_Regs\_V1 --- Alpha EV6, UnCorrectable Error Registers Frame V1.0

<i>Frame_Size</i>	<i>88</i>
<i>Frame_Flags</i>	<i>x80000000</i>
<i>CPU_Area_Offset</i>	<i>24</i>
<i>System_Area_Offset</i>	<i>56</i>
<i>Mchk_Error_Code</i>	<i>x00000098</i>
<i>Frame_Rev</i>	<i>1</i>
<i>I_STAT</i>	<i>x0000000000000000</i>
<i>DC_STAT</i>	<i>x0000000000000000</i>
<i>C_ADDR</i>	<i>x0000000123484180</i>
<i>C_SYNDROME_1</i>	<i>x0000000000000000</i>
<i>C_SYNDROME_0</i>	<i>x00000000000000D3</i>
<i>C_STAT</i>	<i>x000000000000001B</i>
<i>C_STS</i>	<i>x0000000000000000</i>
<i>MM_STAT</i>	<i>x0000000000000000</i>
<i>EXC_ADDR</i>	<i>x0000000000000000</i>





# Hex Dump Example - continued

The screenshot shows a window titled "Node 'localhost'" with a search icon and the text "Display Information". Below this, a message states: "Problem Found: System Memory double-bit fill on CPU istream or dstream load detected." A list of events follows, with the selected entry being: "Event occurred at Fri, 31 Jul 1998 21:33:57 -0400 SysType\_34 OS\_Type\_1 Entry\_Type\_670 Mchk\_Error\_Code152". Below the events, a hex dump is displayed for "Subpkt\_C12\_T07\_V1 --- Extended Common Tsunami/Typhoon Memory Packet". The dump shows several fields with their hexadecimal values: AAR\_0 (x0000000123406000), AAR\_1 (x0000000000000000), AAR\_2 (x0000000000000000), AAR\_3 (x0000000000000000), P0\_CTL (x0000000000000000), and P1\_CTL (x0000000000000000). Below the hex dump, the "Subpacket\_Header\_Support --- Common Subpacket Header V1.0" section lists: Subpacket Length 8, Subpacket Class 0, Subpacket Type 0, and Subpacket Revision 1. Finally, the "Trailer\_Frame\_Support --- Event Trailer Support Class" section lists: Trailing\_Length 984 and Event\_Trailer x5E3C7E25.

Node 'localhost'

Display Information

Problem Found: System Memory double-bit fill on CPU istream or dstream load detected.

Event occurred at Fri, 31 Jul 1998 21:33:57 -0400 SysType\_34 OS\_Type\_1 Entry\_Type\_670 Mchk\_Error\_Code152

Event occurred at Tue, 10 Nov 1998 18:21:59 -0500 SysType\_34 OS\_Type\_1 Entry\_Type\_310

Subpkt\_C12\_T07\_V1 --- Extended Common Tsunami/Typhoon Memory Packet

AAR\_0 x0000000123406000

AAR\_1 x0000000000000000

AAR\_2 x0000000000000000

AAR\_3 x0000000000000000

P0\_CTL x0000000000000000

P1\_CTL x0000000000000000

Subpacket\_Header\_Support --- Common Subpacket Header V1.0

Subpacket Length 8

Subpacket Class 0

Subpacket Type 0

Subpacket Revision 1

Trailer\_Frame\_Support --- Event Trailer Support Class

Trailing\_Length 984

Event\_Trailer x5E3C7E25

## General Ruleset Information

- **All FRU high probability callouts:**
  - FRU information encoded & written into FRU EEPROM SDD section of DPR
  - Information can be used by module repair
- **All FRU callout ASCII information:**
  - Information written into DPR System Global Error area
    - 2B00:2BFF, 2C00:2CFF, 2D00:2DFF
  - Accessible for field use via:
    - Local system console
    - Local/remote RMC access
- **Planning to enhance CA GUI with HTML hyperlinks**
  - Direct access to FRU repair plans, processes & procedures
  - Information will be system-resident or Web-based

## CPU Correctable/Uncorrectable

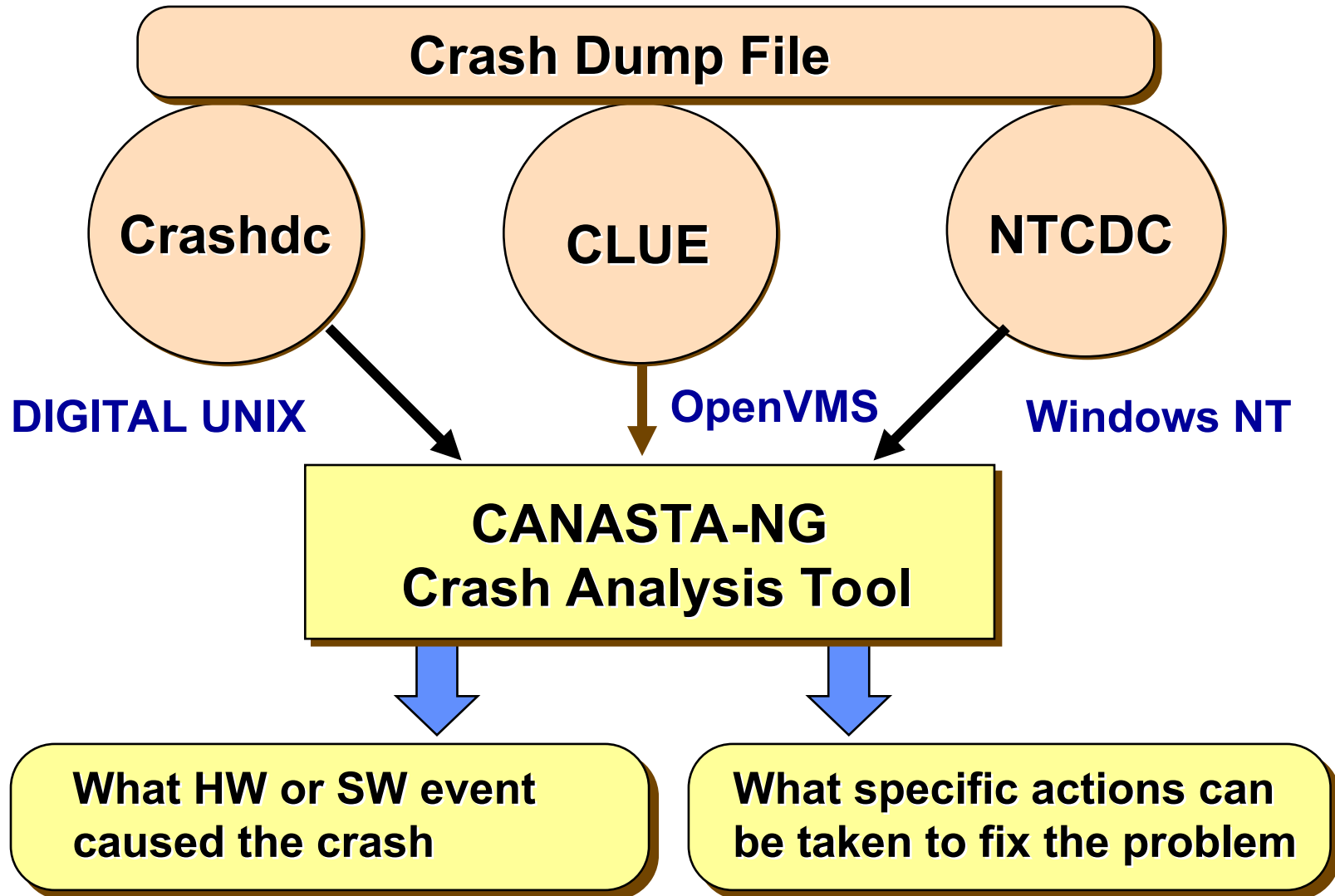
- **Multi-event correlation**
- **Filter thresholding for all CPU single-bit faults**
- **FRU callout reporting includes:**
  - **Faulty FRU(s)**
  - **FRU erred address, data bit**
  - **Physical location Jx**
  - **Part number & serial number**
  - **Firmware rev. or model number**

## System Correctable/Uncorrectable

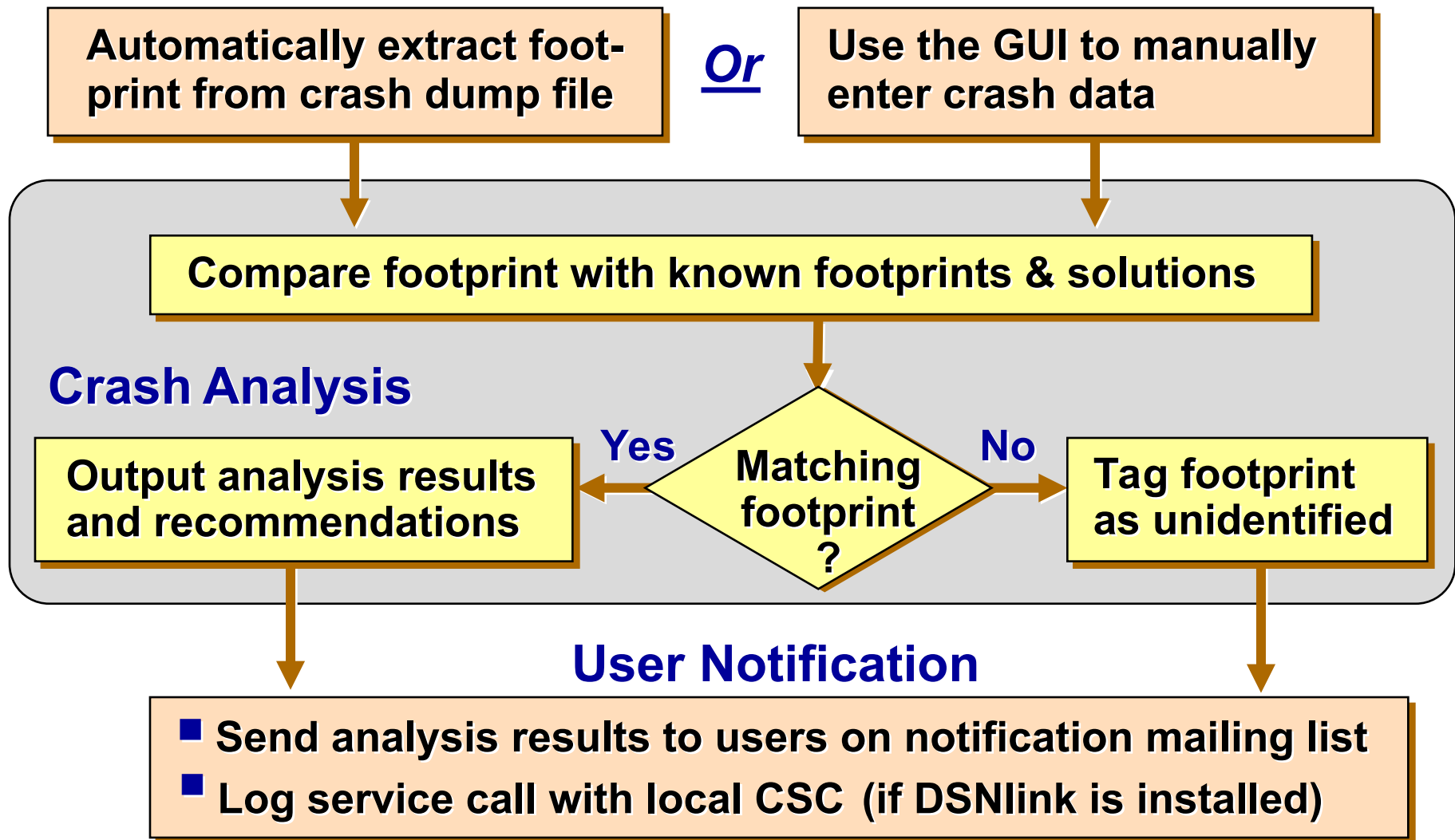
- **Multi-event correlation**
- **Filter thresholding for Pchip 0 & 1 single-bit direct mapped and scatter/gather DMA ECC faults**
- **Pchip faults such as:**
  - Target abort
  - No device select
  - SERR#, PERR#
- **Cchip NXMs with MISC<NXS> faults**
- **FRU callout reporting includes:**
  - Faulty FRU(s), erred address, data bit
  - Physical location Jx
  - Part number & serial number
  - Firmware rev. or model number

## Environmental Correctable/Uncorrectable

- **System zones and functional area monitored:**
  - Temperature warning/failure
  - Fan failure
  - Fan control failure
  - Door open
  - Power supply failure
- **FRU callout reporting includes:**
  - Faulty FRU(s)
  - FRU physical location Jx
  - Part number & serial number
  - Firmware rev. or model number

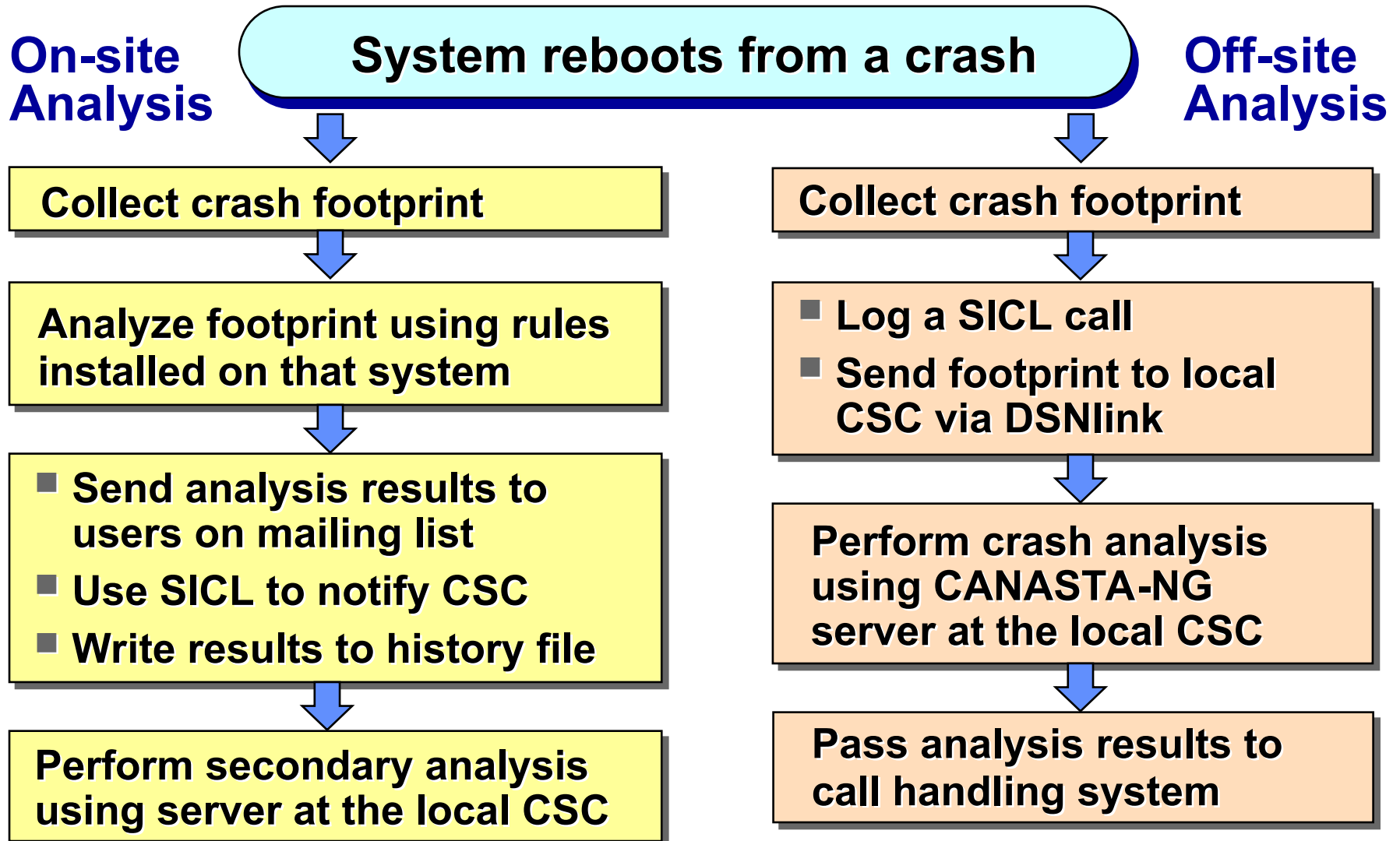


# Crash Analysis & Notification





# On-site/Off-site Crash Analysis



# Crash Analysis Options

## Automatic Crash Analysis

- Initiated when system reboots following a crash
- Analysis automatically performed on footprint
- Notification sent to customer mailing list
- Full report sent to each user on internal Compaq Services notification list

## Manual Crash Analysis

- User selects crash dump file for analysis

OR

- User enters parameters required for footprint and initiates analysis
- GUI displays results of crash analysis

# CANASTA-NG User Interface

## Browser-Style GUI

- View crash history file
- Input data for analysis
  - Select crash data file
  - Enter data manually
- View results of crash analysis

The screenshot displays the CANASTA-NG application window. It features a menu bar with 'File' and 'Help'. Below the menu bar are tabs for 'VMS\_VAX', 'DIGITAL UNIX', 'OPENVMS ALPHA', and 'WINDOWS NT'. The left pane shows a tree view of 'CANASTA-NG Parameters' with sub-items: 'OS Version', 'Crash Time', and 'Bugcheck'. The right pane displays a form with various fields for crash data, including 'OS Version', 'Crash Time', 'Bugcheck', 'Host Name', 'CPU Type', 'Process Name', 'Image Name', 'Signal Array', 'Condition Code', 'Reason Mask', 'Virtual Address', 'Exception PC', 'Exception PSL', 'Name+Offset: Instr', 'Map Module', and 'Map Offset'. At the bottom of the right pane are 'Apply' and 'Clear' buttons. Below the main form is a 'CANASTA-NG Results' section showing the source rule set and the number of rules matching the case.

Field	Value
OS Version	V7.1
Crash Time	2-JAN-1998 20:19:01.02
Bugcheck	INVEXCEPTN,
Host Name	DVAXP1 (Clustered)
CPU Type	DEC 7000 Model 610
Process Name	NET\$MOP
Image Name	[SYSEXEC]NET\$MOP.EXE;1
Signal Array	00000005
Condition Code	0000000C
Reason Mask	00010000
Virtual Address	00000008
Exception PC	806F3710
Exception PSL	00000803
Name+Offset: Instr	NET\$MOP\$0_NPRO+01710: LDQ
Map Module	NET\$MOP\$0
Map Offset	00001710

**CANASTA-NG Results**

Source Rule Set: AXP\_RULES\_V71.SRC  
Source Rule Set Date: 9/11/1998

---- Number of Rules Matching this Case ----  
Rule Match Count: 1