A Comprehensive Cluster Monitoring System

PARMON Launcher

INTRODUCTION

Workstation clusters have off late become a cost-effective solution for high performance computing. C-DAC's PARAM OpenFrame* is a large cluster of high performance workstations interconnected through low-latency, high bandwidth communication networks. Monitoring such huge systems is a tedious and challenging task. System Administrators require tools to effectively monitor such huge systems. PARMON* provides the solution to this challenging problem.

Unlike other monitoring systems, PARMON is designed using the latest Java* Computing Technologies and offers a portable, flexible, and comprehensive environment for monitoring of large clusters. It follows client-server methodology and provides transparent access to all nodes to be monitored from a monitoring machine.

DESCRIPTION

PARMON allows the user to monitor activities and resource utilization of various components of workstation clusters. It monitors the machine both at node level and at the entire system level exhibiting a single system image. PARMON, monitors process activities, system logs, kernel activities; controls devices; and allows generation and analysis of events. It also provides physical and logical views of the components of the system.
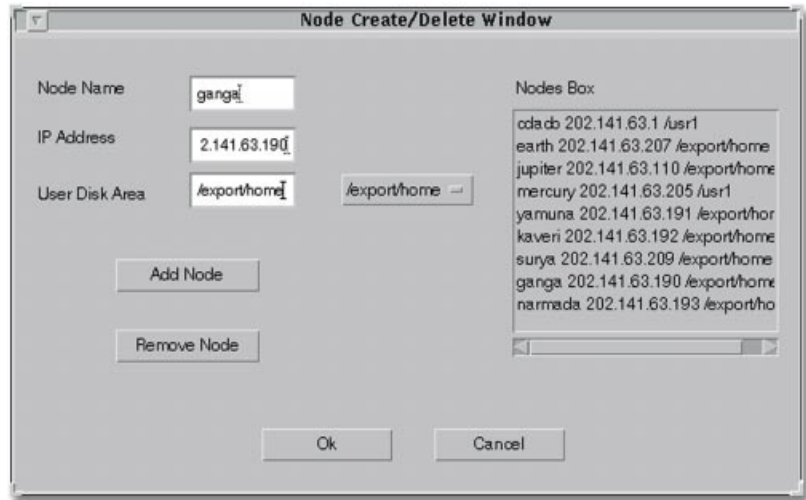
HIGHLIGHTS

☐ Supports monitoring of cluster at node level, group level, or entire system level.

☐ Allows monitoring of system resources and their parameters at both macro and micro level.

☐ Supports listing of system information and machine configuration of all nodes of a cluster.

☐ Allows the user to build system database of nodes and groups.

☐ Exploits latest software technologies like Java to provide portability across platforms.

● SYSTEM MODEL

PARMON consists of the *parmon* client and the *parmond* server. The nodes to be monitored serve as servers and they can be monitored from any workstation, PC or a node of the cluster itself. The *parmond* server is loaded on all the nodes that need to be monitored. A client requests for parameters through message passing and gets it in the form of messages. The client interprets the messages and converts into appropriate format for graphical presentation. A client can either monitor all the nodes or selectively monitor a few nodes of the cluster. For effective monitoring, the concept of group is supported. A set of nodes form a group and is created based on the allocation of resources to various user groups. Such grouping mechanism helps in monitoring and gathering usability statistics with which the system administrator can change the resource allocation strategy.

Node Database Management

● MONITORING FEATURES

PARMON allows to monitor the following system activities and parameters:

Process Activities

The utilization of CPU resource can be measured by monitoring process activities. The parameters that can be
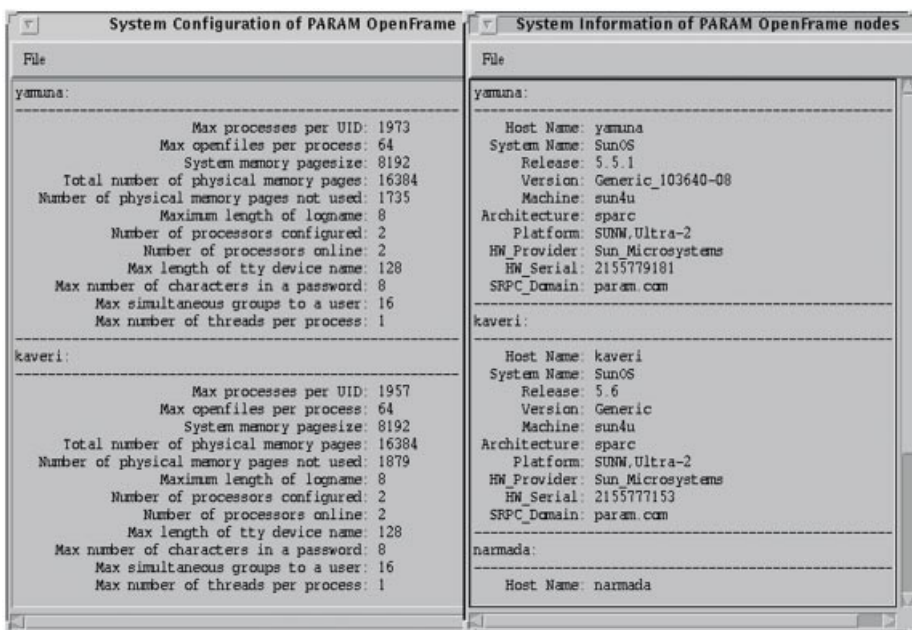
monitored using PARMON are: pid, command, uname, uid, nice, status, user (%), sys (%), total (%), total CPU (%), and start up time. PARMON continually updates the process and system data at a user specified sampling interval, which helps in identifying CPU-intensive processes.

System Logs

PARMON helps in effective monitoring of system logs maintained by the operating system. PARMON allows to process system messages and syslog files for entries that occur at a specific time or for entries that contain a specific keyword, or word pattern.

Kernel Activities

PARMON supports software instrumentation of system resources such as CPU, Memory, Disk, and Network. When a particular resource has more than one instance, PARMON allows monitoring of each resource instance individually.

Accessing System Information/Configuration

CPU Parameters

The monitoring of CPU parameters helps in understanding how CPU is being utilized. PARMON allows to monitor graphically the number of mutex, interrupts, context switches, system calls, forks, execs, page in, page out, swapin, and swapout operations performed in times per second. It also allows to monitor process run queue length, I/O queue length, and swap queue length.
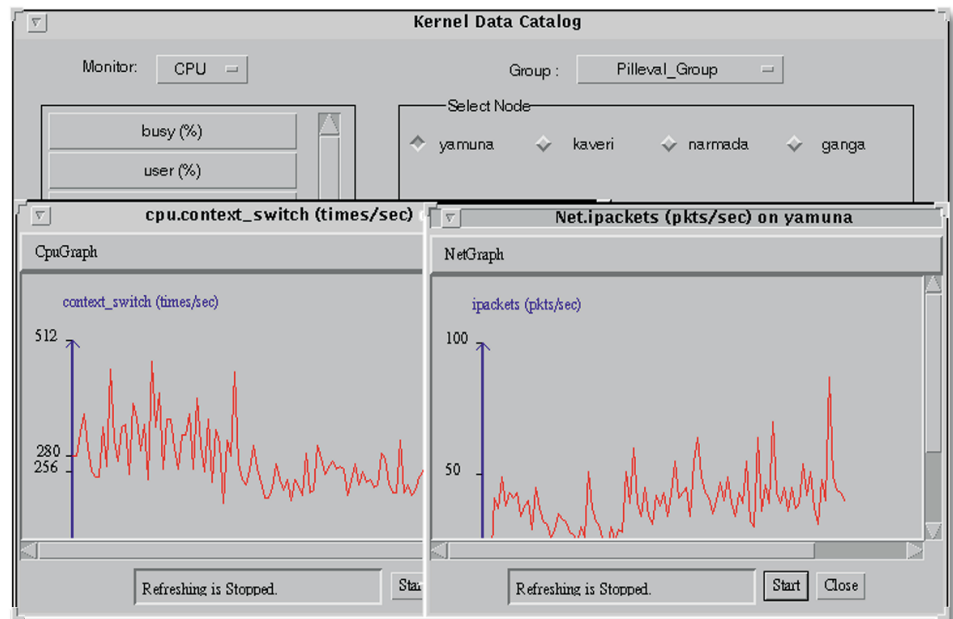
Memory Parameters

PARMON allows continuous instrumentation of memory availability, memory in-use, free memory, percentage of memory in-use, reserved swap space, allocated swap space, and available swap space.

Disk Parameters

PARMON allows to monitor disk operations such as reads, writes, number of jobs waiting in the queue for disk service, and disk's runtime and wait-time.

Network Parameters

The software instrumentation of network parameters such as input packets, output packets, errors in packet transmission helps in detecting network bottlenecks. PARMON also allows displaying the percentage of incoming and outgoing data packets containing packet format errors.

Kernel Data Catalog for Software Instrumentation

COMPONENT VIEW : PHYSICAL AND LOGICAL

PARMON allows displaying system picture and that of a few important components, which helps the user in quick understanding of machine's physical look-and-feel. It also displays different views of the machine from the front, back, etc.

The Logical View allows to display system components in a hierarchical manner. System components include processing elements, file system, and network components which are probed dynamically. Each item in the hierarchy diagram can be further probed for more detailed information. For instance, when file system (fs) is probed, it shows all logical partitions of the disk and other details such as partition name, allocated disk space, and disk usage both in terms of bytes and percentage.

DEVICE CONTROL

PARMON also supports control of multiple instances of the same resource, like the multiple CPUs in a SMP node where it allows to set a CPU in on-line or off-line mode.

EVENTS GENERATION

PARMON allows to trigger some events such as sending e-mail when the user crosses resource utilization limits. This helps the administrator to have effective control over machine resource utilization.

DIAGNOSTICS

Under Solaris*, PARMON integrates SunVTS* to do validation testing and stress testing on external devices such as disk and tape drives and network connectivity. SunVTS helps in locating problems under Solaris with components

that managed to pass the configuration test (POST*), as well as problems with external devices that POST knows nothing about.

ON-LINE HELP

PARMON offers comprehensive online help. The user can choose the functionality in the main help menu and then navigate to specific details of how each service can be accessed and interpreted. PARMON online help also has a glossary of technical terms and parameters that are often used in PARMON or among cluster computing community.

AVAILABILITY

Supported Hardware	:	Workstation Clusters
Supported Operating System	:	Solaris 2.5 and above
User Interfaces	:	GUI
Prerequisite Software	:	Java

Additional Information

For more information on CDAC HPCC software, contact your CDAC marketing representative, access the CDAC Home Page on the internet World-Wide Web (www.cdac.org.in), or send an e-mail over the internet to : ssg@cdacb.ernet.in

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