HP Software Performance Analyzer Model 64708A/B1487A

Technical Data

Description

The HP 64708A Software Performance Analyzer makes it easy for you to profile software operation and identify bottlenecks so you can fine tune application software. This plug-in analyzer card for the HP 64700A instrumentation card cage provides software performance analysis for 8-bit, 16-bit, or 32-bit microprocessors. Connected to the internal system bus and the emulation bus in the card cage, the analyzer is nonintrusive to the system under test. The Software Performance Analyzer is compatible with HP 64700 Series emulators that use a 25 MHz emulation bus analyzer (HP 64703A, 64704A, 64706A). It is controlled by an HP 9000 Series 300/400/700 or Sun SPARCstation hosted user interface, based on the X11/Motif standard to maximize ease-of-use.

The HP Software Performance Analyzer provides real-time measurements of embedded code execution at the source or assembly level. This analysis is necessary for:

• debug of time-critical system software

• tuning the performance of time-sensitive systems

• verification of code execution to specified timing requirements

• measurement and documentation of embedded system performance characteristics

• comparison of design alternatives based on performance
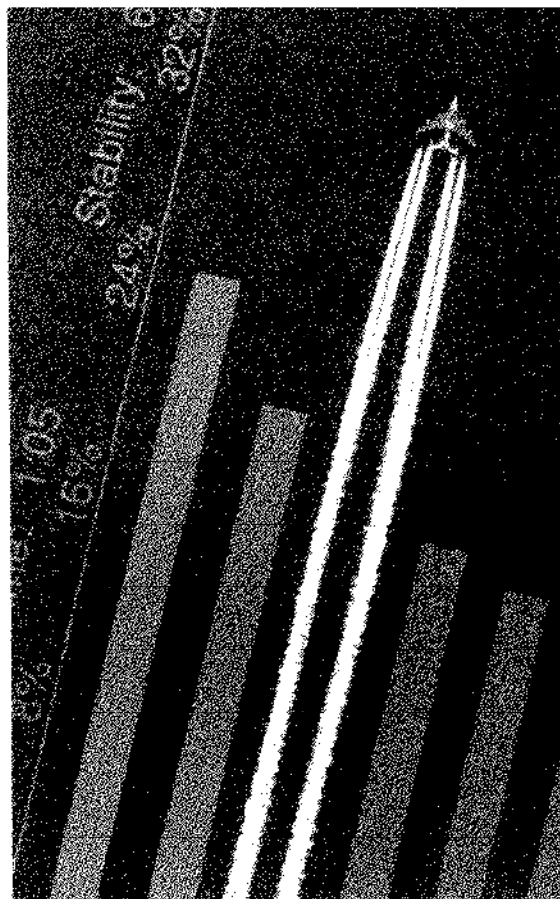
Features

The HP Software Performance Analyzer is the most effective tool available for reducing the time and effort spent resolving software performance problems and verifying compliance with specifications. It allows embedded systems designers to locate software bottlenecks and identify the amount of time a module takes to execute using four measurement modes:

- Program activity measurements rapidly isolate functions that are performance bottlenecks

- Memory & I/O activity measurements identify areas that are candidates for optimization

- Module duration measurements provide statistics on the execution times of functions, including minimum/maximum times for best/worse case execution time

- Interval duration measurements provide execution statistics on events defined by any two address points

Data is displayed in the form of histograms or data tables. Histograms show cumulative time, number of calls, or number of bus cycles. Data tables include number of calls, number of bus cycles, cumulative, maximum, minimum, mean, and standard deviation times.

Integration with Emulation and Analysis

Integration with HP 64700 series emulation and analysis tools minimizes setup effort:

- Automatically configures to the emulator by reading and loading of program symbols from the emulator data base

- The initial measurement (program activity) is automatically set up, and with the press of a button, the analyzer performs the measurement based on information read from the emulator symbol data base.

X11/Motif Graphical User Interface

The graphical interface is based on the X11/Motif standard and provides the identical look-and-feel as HP's graphical user interface products for HP 64700 Series emulators and analyzers. The software performance analysis interface brings the full measurement power of the analyzer to the user via clear, easy-to-understand commands and displays.

Features include:

- easy pulldown menu calls up the Software Performance Analyzer from the emulator

- single key press performs program activity measurement to immediately spot code bottlenecks

- point and click interaction speeds data manipulation and measurement setup
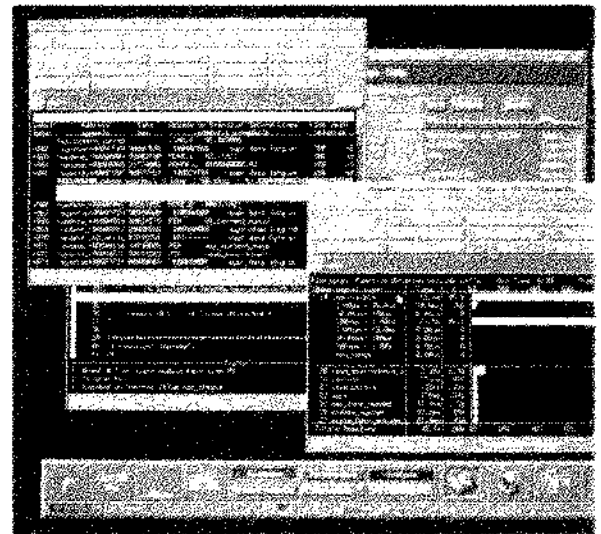
The HP Software Performance Analyzer has the same look and feel as other HP 64700 tools.

- powerful, easy-to-use data sorting highlights relevant information in the displays

- default time-ranges for duration measurements allow rapid measurement setup and execution

- user definable "action keys" automate common tasks

- pull down menus offer rapid command understanding and formation

- on-line help reduces dependence on manuals

- support for both mouse and softkey command entry

Activity Measurements

Program activity measurements are an excellent starting place for isolating performance problems in embedded code. Activity measurements are used to discover which functions, or which data and I/O areas, are performance bottlenecks. Up to 254 events (functions, variables, or address ranges) can be tracked simultaneously, minimizing the number of measurement iterations needed to cover a program with a large number of symbols. Activity measurements help answer questions like:

• Which modules are slowing down overall program execution?

• Is the activity of a data or I/O prot excessive?

Activity measurements sample bus activity over a set of address ranges to provide information about the intensity of activity (defined as either execution time or bus cycle count). Program Activity measurements are used to obtain information about program execution. Memory and I/O Activity measurements record usage of static variables and I/O areas.

The program activity measurement is the default measurement of the analyzer. The "profile" button can be selected with the mouse and the analyzer automatically performs a program activity measurement on the first 254 functions that are read from the symbol database. All setup activity is transparent to the user, and the resulting display shows a histogram of execution activity, by name of the first set of 254 functions. The results can be quickly sorted by execution time, alphabetically, or by event number for rapid comprehension.
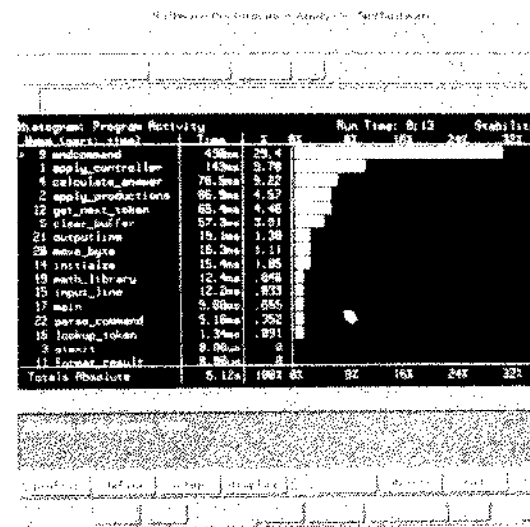
Program activity measurements quickly isolate performance problems.

Duration Measurements

Once an activity measurement has highlighted the functions with performance problems, duration measurements are used to determine the scope of the problems. Duration measurements record the time durations of functions (Function Duration) or durations between repetitive calls to a single address or between any two addresses (Interval Duration).

Duration measurements are non-sampled; they capture all execution activity for up to 84 defined events. The nonsampled nature of duration measurements allows engineers to test their code and prove, with very high confidence, that the execution times of key time critical functions never exceed required limits. Real-time tests can be run over many days, if necessary, to verify proper execution performance.
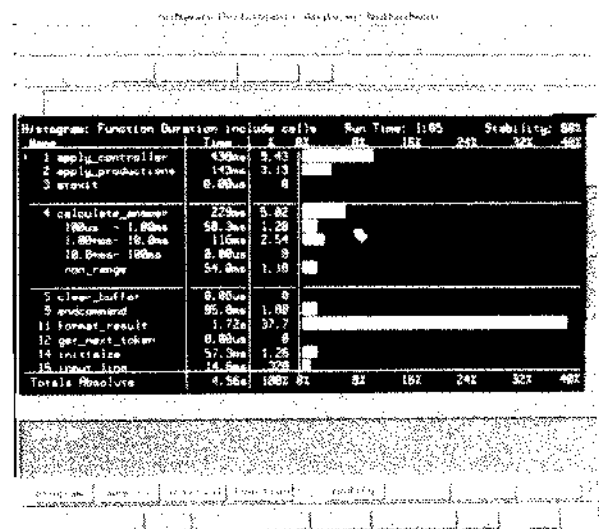
Duration measurements gather statistics on min/max/mean execution times, providing execution analysis on functions identified as bottlenecks by a Program Activity measurement.

Similar to activity measurements, results are displayed using histograms or data tables. In either display mode, you can select any event on the display and expand the data for that event to show the distribution of execution times across a user-defined set of time ranges. This is used to obtain a graphical view of how execution time varies over multiple executions.

Upon locating a function that is not behaving as expected, you can, with the click of the mouse, define a trigger to cause an emulation break or emulation analysis trace. The trigger occurs when the duration of the function or event exceeds a specified time.

When using the function duration measurement mode, you can select either including or excluding calls. The including calls measurement records the time spent in the function and the time spent in all called functions. The excluding calls measurement records only the time spent in the named function and excludes all other times. Switching between these two modes allows you to quickly determine where your time problems are located.

The interval duration measurement allows you to measure the time between the start of one function and the end of another, time between writes to two variables, or accesses to an I/O port. Up to 84 events can be measured simultaneously. Both function and interval duration results can be sorted by time, number of calls, address, alphabetically, or in a defined order.

Duration histogram pinpoints functions that are slow and inefficient.

Duration table provides additional details about functions.

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Specifications

Compatibility
Operates with emulators that use 25 MHz emulation bus analyzers, HP 64703A, 64704A, 64706A

Characteristics

Measurement Modes:
Program Activity
Memory and I/O activity
Function duration including calls
Function duration excluding calls
Interval durations

Maximum Bus Rate: 25 MHz

Timing Clock Rate: 50 MHz (20ns)

Timing Resolution: +/- 40ns

Maximum Continuous Measurement Time: 24 days

Trigger Duration Range:
1 us—2 seconds

Trigger Duration Resoluton: 1 us
+/- 160ns

Emulator Trigger Delay: approx 500 ns

Defined Events: 1000

Expanded Events: 10

Expanded Time Ranges: 10

Enable Disable Feature
Enable/Disable Pairs: One
Enable: Available in all Measurements
Disable: Available in Interval/Function Duration Measurements

Activity Measurements:
(sampled)
Measured Events: 254

Maximum Continuous Event Rate: 25 MHz

Sampling Period: 2.5ms per active event

Scanning Period: 5.0 ms +
(2.5 ms * number_of_events)

Interval Duration Measurements: (real-time data collection; nonsampled)
Measured Events: 84

Maximum Continuous Event Rate: 80us for entry/exit pair [Note 1]

Minimum Continuous Event Rate: none

Maximum Number of Events at Burst Rate of 25 MHz: approx 500

Function Duration Measurements (real-time data collection; nonsampled):
Measured Events: 84

Maximum Continuous Event Rate: 100 us for entry/exit pair [Note 1]

Minimum Continuous Event Rate: 1.25s for entry or exit event

Maximum Number of Events at Burst Rate of 25 MHz: approx 500

Histogram Types Available
Time, Calls, Cycles

Table Data Available
Activity: Cumulative Cycles, Cumulative Time, Time %, Mean Time Stdv Time, Time/Cycle

Duration: Cumulative Calls, Cumulative Time, Time %, Max Time, Min Time, Mean Time, Stdv Time

Sorting Orders Available
Time, Calls, Cycles, Address, Alphabetical, Defined order

Power Requirements
Power supplied by card cage.

Note: [1] Expanded events, or prefetched event entry/exit addresses will reduce the Maximum Continuous Event Rate.

Ordering Information

Model	Description
64708A	**Software Performance Analyzer**
B1487A	**SW Performance Analysis Hosted User Interface**
Opt UBX	Single User Lic - HP 9000 Series 300/400
Opt AAX	Media and Doc - HP 9000 Series 300/400
Opt UBY	Single User Lic - HP 9000 Series 700
Opt AAY	Media and Doc - HP 9000 Series 700
Opt UBK	Single User Lic - Sun SPARCsystems
Opt AAK	Media and Doc - Sun SPARCsystems

Please call your HP 64000 field engineer for information about which processors are supported.

Ordering Information

Complete Emulation System

Model	Description
64737F	H8/532 Emulator Card
64738F	H8/520 Emulator Card
64739A	H8/534/536 Emulator Card
64732A	H8/510 Emulator Card
64725A	8-bit, 128 Kbytes Emulation Memory (for H8/520/532/534/536)
64727A	16-bit, 512 Kbytes Emulation Memory (for H8/510)
64706A	48-channel Emulation Bus Analyzer Card (for H8/520/532/534/536)
64704A	80-channel Emulation Bus Analyzer Card
64700A	Card Cage

Emulation System Options

64726A	16-bit, 128 Kbytes Emulation Memory (for H8/510)
64728A	16-bit, 1 Mbyte Emulation Memory (for H8/510)
64703A	64-channel Emulation Bus Analyzer Card with 16 channels of external state/timing

64737S   H8/532 Host Interface Software
Opt 004   Softkey Interface hosted on HP 9000 Series 300/400 workstations*
Opt 006   PC Interface on IBM PC/XT, PC/AT, HP Vectra PCs and compatibles

64738S   H8/520 Host Interface Software
Opt 004   Softkey Interface hosted on HP 9000 Series 300/400 workstations*
Opt 006   PC Interface on IBM PC/XT, PC/AT, HP Vectra PCs and compatibles

64739S   H8/534/536 Host Interface Software
Opt 004   Softkey Interface hosted on HP 9000 Series 300/400 workstations*
Opt 006   PC Interface on IBM PC/XT, PC/AT, HP Vectra PCs and compatibles

64732S   H8/510 Host Interface Software
Opt 004   Softkey Interface hosted on HP 9000 Series 300/400 workstations*
Opt 006   PC Interface on IBM PC/XT, PC/AT, HP Vectra PCs, and compatibles

64869L/M/U Cross Assembler/Linker for H8/500 Family
Opt 004   For HP 9000 Series 300/400 workstations

64869L/M Cross Assembler/Linker for H8/500 Family
Opt 006   For IBM PC/XT, PC/AT, HP Vectra PCs and compatibles

64701A	LAN Card (supported on HP 9000 workstations)
64037A	RS-422 Interface Card for PC compatibles
98659A	RS-422 Interface Card for HP 9000 workstations
64023A	CMB Cable (4 m long includes three 9-pin connectors)

64738-61611 64-pin SDIP Adapter for H8/520

Note: an RS-232-C interface is supplied with all HP 64700A card cages.

Software Support

HP provides software upgrades through the purchase of the Software Materials Subscription (SMS) service. Contact your HP sales representative for more information.

* Requires HP 64801 Operating Environment software.