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File:           mlsTrace tool User Manual
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Description:    This document describes the use and features of mlsTrace.
                mlsTrace is a Pin tool developed to capture and record
                memory reads and writes in multithreaded programs running under Pin.
                Each memory-referencing operation is captured and its
                descriptor is recorded into a trace file.

                IMPORTANT Note: If an instruction includes multiple memory operations,
                each operation will have a separate descriptor in the output trace.
                Intel64 instruction set includes instructions that can
                read one or two operands from memory, write the result to memory,
                or read from and write to memory. Instructions such as compare string
                can actually access a number of operands in memory.
                To avoid encoding inside a trace record we emit a trace descriptor
                for each memory access. Thus one instruction may have multiple
                trace records. Instruction set simulator should be able to replay
                the trace records correctly.

Date:           October 11, 2013
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1. Tool Setup (Compilation)

a) Requirements: Linux computer with Pin installed.
To learn more about Pin and to download the latest version visit
http://software.intel.com/en-us/articles/pin-a-dynamic-binary-instrumentation-tool.
Examples in this manual are prepared on a x86_64 quad core machine running CentOS 6.3 OS
with pin-2.12-58423.

b) Download source code files for mlsTrace:
mlsTrace.cpp
mlsTrace.h.
mlsTraceAssist.h

c) Copy source code files into Pin directory
pin-2.12-58423-gcc.4.4.7-linux/source/tools/ManualExamples

d) create obj-intel64 directory in
pin-2.12-58423-gcc.4.4.7-linux/source/tools/ManualExamples

e) Add mlsTrace to the TEST_TOOL_ROOTS line in
pin-2.12-58423-gcc.4.4.7-linux/source/tools/ManualExamples/makefile.rules

f) Add -std=c++0x to the TOOL_CXXFLAGS_NOOPT line in
pin-2.12-58423-gcc.4.4.7-linux/source/tools/Config/makefile.unix.config

g) Build tool/tools

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        Trace store instructions (default)
-unique_logfile  [default 0]
        The log file names will contain the pid

Line information controls

-discard_line_info
        Discard line information for specific module. Module name should be a
        short name without path, not a symbolic link
-discard_line_info_all  [default 0]
        Discard line information for all modules.

Symbols controls

-short_name  [default 0]
        Use the shortest name for the RTN. Names with version substrings are
        preferred over the same name without the substring.
-unrestricted_rtn_size  [default 0]
        Use the unrestricted RTN size. When set the RTN size defined by the
        distance between RTN start to the beginning of next RTN.

Statistic switches

-profile  [default 0]
        print amount of memory dynamically allocated but not yet freed by the
        tool
-statistic  [default 0]
        print general statistics

General switches (available in pin and tool)

-slow_asserts  [default 0]
        Perform expensive sanity checks

[milenka@EB245-mhealth3 ManualExamples]$
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e) Example run to trace /bin/ls shell command.
In this example mlsTrace captures both the load and the store value trace of ls (list) shell command. The entire trace is captured in a text file. Note a change in the trace record format: an additional field indicates a read (L) or write (S) operation.

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        0 ( %0.00 ) Operands of other size
mlsTrace: 204242 write memory operands.
        7185 ( %3.52 ) Byte Operands
        98 ( %0.05 ) Word Operands
        41333 ( %20.24 ) Doubleword Operands
        155235 ( %76.01 ) Quadword Operands
        0 ( %0.00 ) Extended Precision Operands
        391 ( %0.19 ) Octaword Operands
        0 ( %0.00 ) Hexaword Operands
        0 ( %0.00 ) Operands of other size

[milenka@EB245-mhealth3 ManualExamples]$ head mlsTrace.out2013_10_13_8.47.13.txt
0, S, 0x0000003f83200b03, 0x00007fff3e10cf80, 8, 0x0000000000000000
0, S, 0x0000003f83201130, 0x00007fff3e10cf78, 8, 0x0000000000000000
0, S, 0x0000003f83201134, 0x00007fff3e10cf70, 8, 0x0000000000000000
0, S, 0x0000003f83201136, 0x00007fff3e10cf68, 8, 0x0000000000000000
0, S, 0x0000003f83201138, 0x00007fff3e10cf60, 8, 0x0000000000000000
0, S, 0x0000003f8320113a, 0x00007fff3e10cf58, 8, 0x0000000000000000
0, S, 0x0000003f8320113c, 0x00007fff3e10cf50, 8, 0x0000000000000000
0, L, 0x0000003f83201156, 0x0000003f8341fb80, 8, 0x0000003f83201130
0, S, 0x0000003f8320115d, 0x0000003f8341fd48, 8, 0x002af4fa0f378c23
0, L, 0x0000003f83201167, 0x0000003f8341ffc8, 8, 0x0000003f8341fdf0
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