eclipse Summit

What's New in CDT 7.0?

CDT Project

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Project Status

- 23 committers
  - Representing IDE vendors, consultants, and users

CodeSourcery · ERICSSON · freescale semiconductor · IBM · INSTITUTE FOR SOFTWARE

intel · Mentor Graphics · NOKIA Connecting People · QNX QNX SOFTWARE SYSTEMS · WIND RIVER

Downloads continue to grow

- Galileo SR-1: 530,000!

- CDT / Linux Tools Summit, Sept 21, 2010
  - Most likely the best summit, focusing on contributions not complaints!
  - http://wiki.eclipse.org/CDT/summitfall2010

What is New?

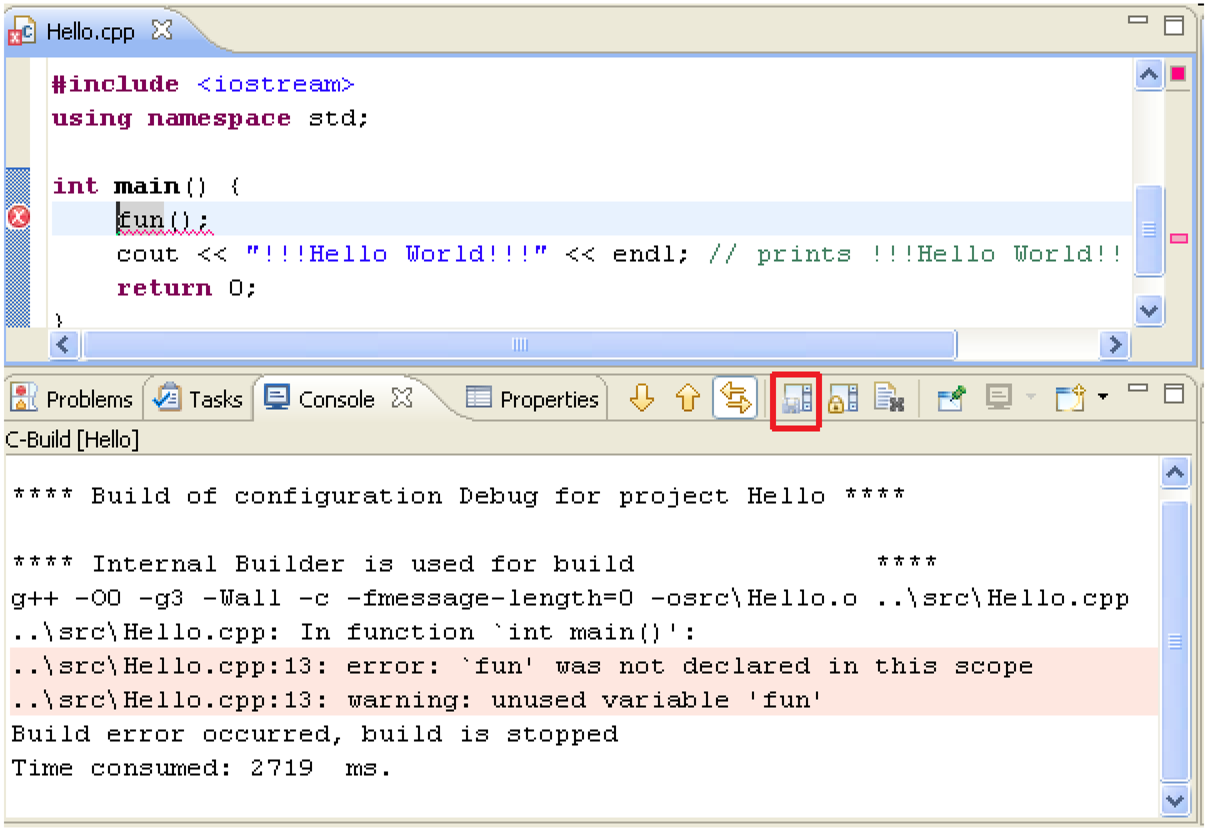
- DSF-GDB as default debugger integration
  - User can still revert back to CDI
  - Vendors writing their own launch configs can choose what they need
- DSF gdb 7.0 support grows, checkpoint
- ***Codan static analysis engine introduction, wow!***
- Usability enhancements
  - Wizard for importing existing code
  - Wizard for adding native support for Android projects
- Much needed bug fixing in build system
- Start on C++0x support (up to gcc 4.3, starting in 4.4)

Even more is new

- New build console
  - Error clicking support
  - Save build output to a file
- Wascana (CDT for Windows)
- Improved Mac support
  - 64-bit binary parser
  - gdb interface fixes
- EDC
  - Compete C/C++ debugger implementation

Build

Errors/warnings highlighting, navigation to location



```
#include <iostream>
using namespace std;

int main() {
    fun();
    cout << "!!!Hello World!!!" << endl; // prints !!!Hello World!!
    return 0;
}
```

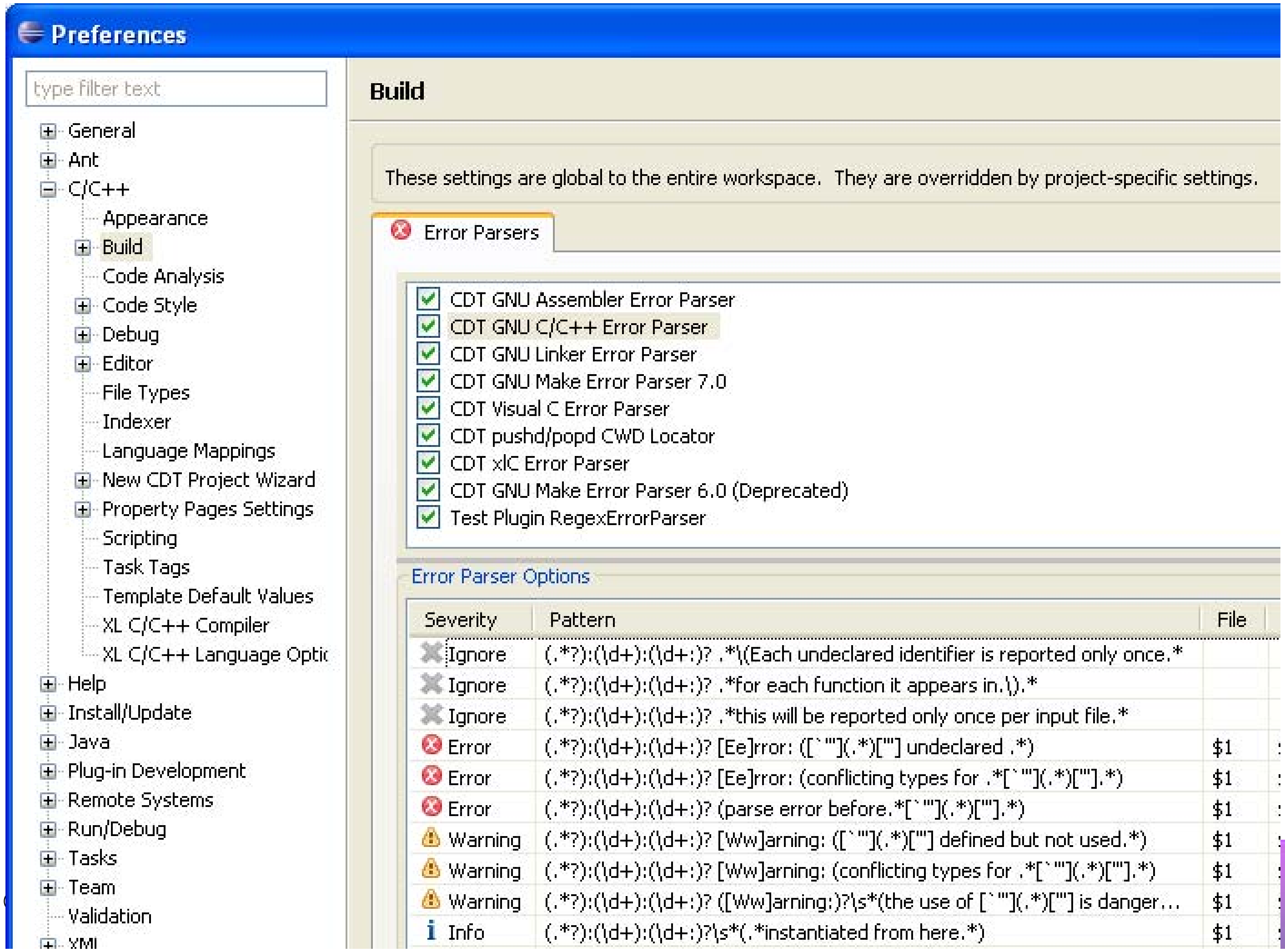
```
**** Build of configuration Debug for project Hello ****

**** Internal Builder is used for build               ****
g++ -O0 -g3 -Wall -c -fmessage-length=0 -osrc\Hello.o ..\src\Hello.cpp
..\src\Hello.cpp: In function `int main()':
..\src\Hello.cpp:13: error: `fun' was not declared in this scope
..\src\Hello.cpp:13: warning: unused variable 'fun'
Build error occurred, build is stopped
Time consumed: 2719  ms.
```

Save console to file

Build

ManagedBuild GCC toolchain supports pre included header files (-include switch to gcc)



Build

These settings are global to the entire workspace. They are overridden by project-specific settings.

- ☑ CDT GNU Assembler Error Parser
- ☑ CDT GNU C/C++ Error Parser
- ☑ CDT GNU Linker Error Parser
- ☑ CDT GNU Make Error Parser 7.0
- ☑ CDT Visual C Error Parser
- ☑ CDT pushd/popd CWD Locator
- ☑ CDT xlC Error Parser
- ☑ CDT GNU Make Error Parser 6.0 (Deprecated)
- ☑ Test Plugin RegexErrorParser

Severity	Pattern	File
Ignore	(.*?):(\d+):(\d+:)? .*\(Each undeclared identifier is reported only once.*	
Ignore	(.*?):(\d+):(\d+:)? .*for each function it appears in.\).*	
Ignore	(.*?):(\d+):(\d+:)? .*this will be reported only once per input file.*	
Error	(.*?):(\d+):(\d+:)? [Ee]rror: ([`'"](.*)['"] undeclared .*)	$1
Error	(.*?):(\d+):(\d+:)? [Ee]rror: (conflicting types for .*[`'"](.*)['"].*)	$1
Error	(.*?):(\d+):(\d+:)? (parse error before.*[`'"](.*)['"].*)	$1
Warning	(.*?):(\d+):(\d+:)? [Ww]arning: ([`'"](.*)['"] defined but not used.*)	$1
Warning	(.*?):(\d+):(\d+:)? [Ww]arning: (conflicting types for .*[`'"](.*)['"].*)	$1
Warning	(.*?):(\d+):(\d+:)? ([Ww]arning:)?\s*(the use of [`'"](.*)['"] is danger…	$1
Info	(.*?):(\d+):(\d+:)?\s*(.*instantiated from here.*)	$1

Regular Expression Error Parser, can be used to parse errors from non-standard compilers

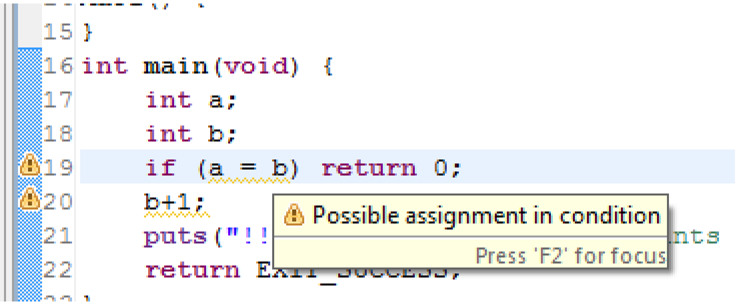
Codan (“Code Analysis”) C/C++ Static Analysis Framework

- Framework for easy pluggable static analysis checkers
- Checkers are finding various problems: code style to complex quality issues
- Comes with a development toolkit witch contains examples of various checkers, corresponding quick fix samples, as well as sample tests.
- Handful of checkers implemented in 7.0 (more as reference point)
- Users can
  - Enable and changing the severity of problems
  - Change parameters and scope
  - Provide a mean to correct problems using “quick fix“
  - Customized launch: run as you type, on demand or during the build

Codan Selected Features

Launch mode

- Run as you type
- Run on build
- Run on demand



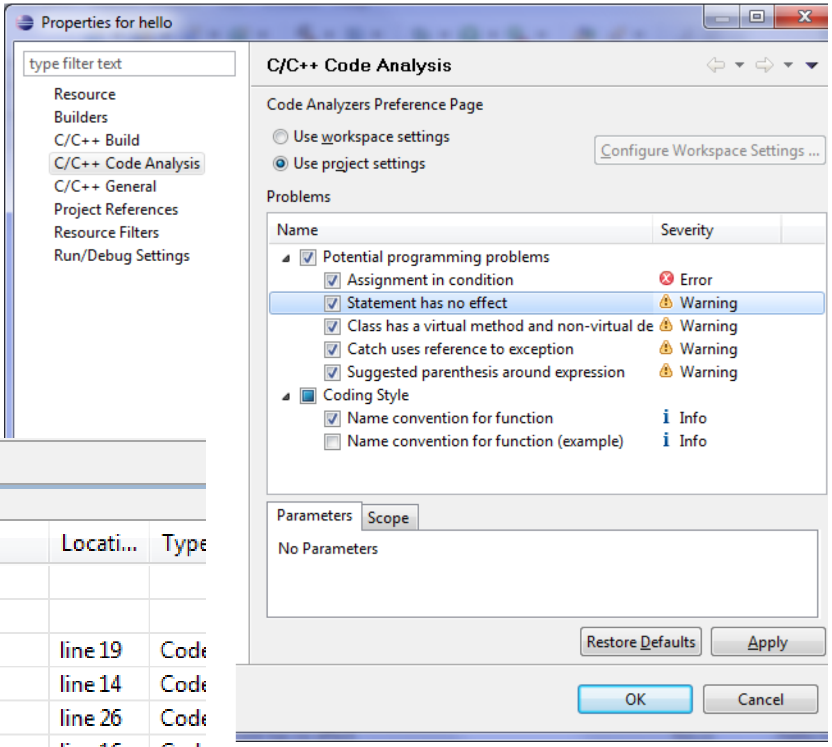
```
15 }
16 int main(void) {
17     int a;
18     int b;
19     if (a = b) return 0;
20     b+1;
21     puts("!!                              nts
22     return E
```

⚠ Possible assignment in condition

Press 'F2' for focus

Problem Preferences

- Either checker enabled or not
- Severity of the Problem
- Checker scope (excluded/included resources)
- Parameters for customizable checker
- Mode of launch



Properties for hello

type filter text

- Resource
- Builders
- C/C++ Build
- C/C++ Code Analysis
- C/C++ General
- Project References
- Resource Filters
- Run/Debug Settings

C/C++ Code Analysis

Code Analyzers Preference Page

○ Use workspace settings

● Use project settings

Configure Workspace Settings ...

Problems

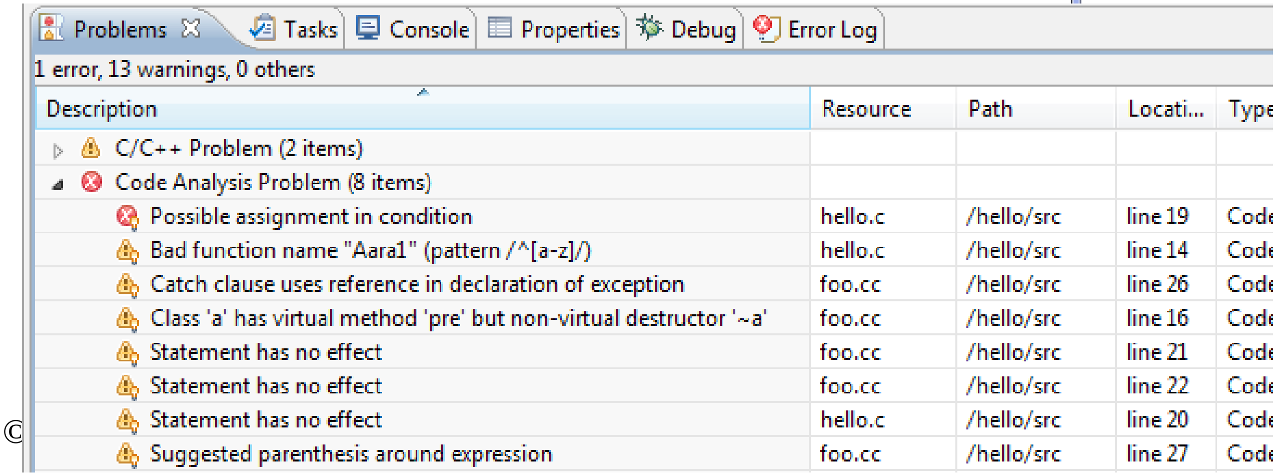
Name	Severity
☑ Potential programming problems	
☑ Assignment in condition	Error
☑ Statement has no effect	Warning
☑ Class has a virtual method and non-virtual de	Warning
☑ Catch uses reference to exception	Warning
☑ Suggested parenthesis around expression	Warning
■ Coding Style	
☑ Name convention for function	Info
□ Name convention for function (example)	Info

Parameters | Scope

No Parameters

Problem Markers

- Code Analysis Problems
- Additional information in Problems details view



1 error, 13 warnings, 0 others

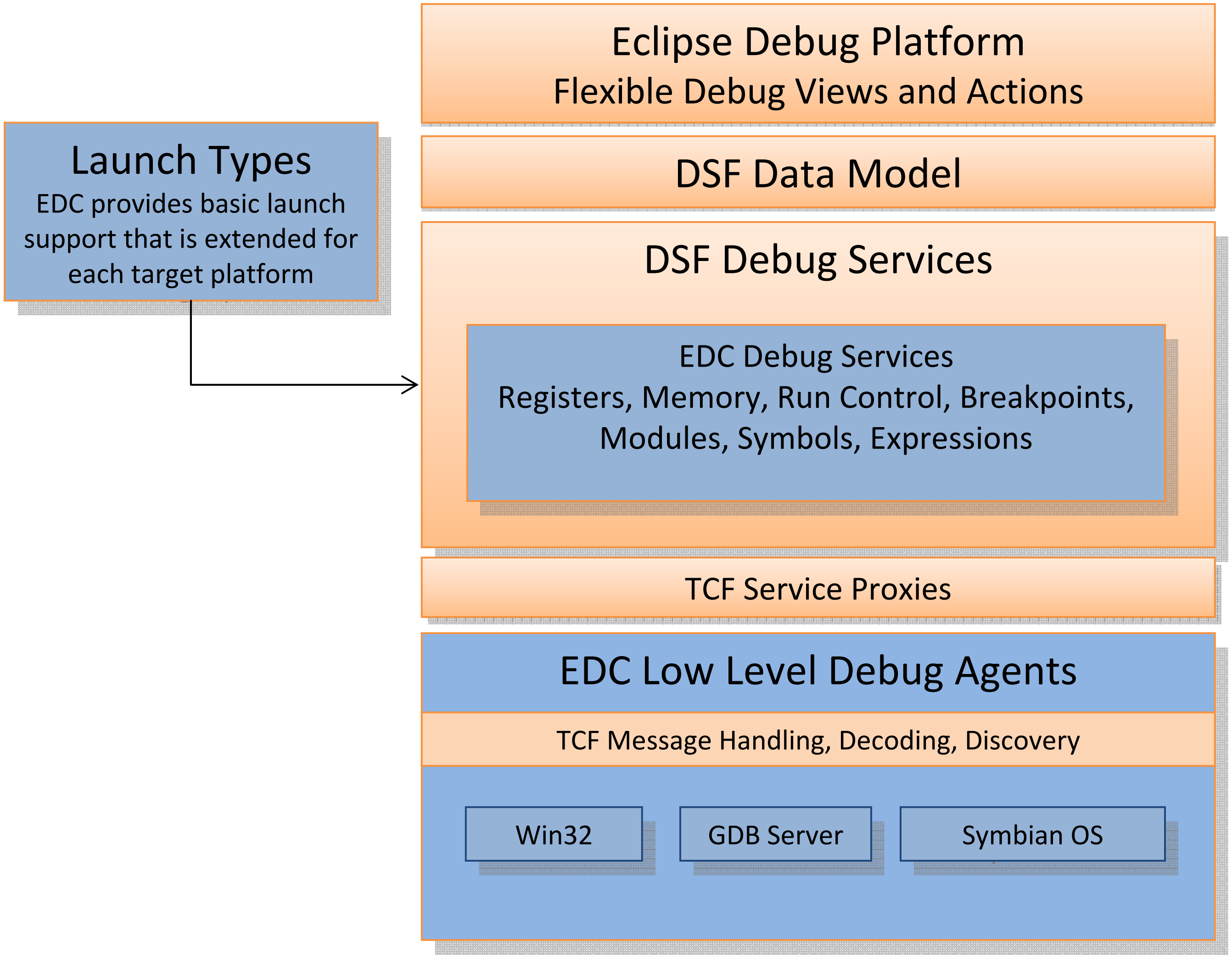
Description	Resource	Path	Locati...	Type
C/C++ Problem (2 items)				
Code Analysis Problem (8 items)				
Possible assignment in condition	hello.c	/hello/src	line 19	Code
Bad function name "Aara1" (pattern /^[a-z]/)	hello.c	/hello/src	line 14	Code
Catch clause uses reference in declaration of exception	foo.cc	/hello/src	line 26	Code
Class 'a' has virtual method 'pre' but non-virtual destructor '~a'	foo.cc	/hello/src	line 16	Code
Statement has no effect	foo.cc	/hello/src	line 21	Code
Statement has no effect	foo.cc	/hello/src	line 22	Code
Statement has no effect	hello.c	/hello/src	line 20	Code
Suggested parenthesis around expression	foo.cc	/hello/src	line 27	Code

©

EDC Overview

- Leverages and connects existing Eclipse debug technology (Platform, CDT, DSF, TCF)
- EDC doesn’t require a debug “back-end”
- Completely asynchronous for best performance
- Pervasive multi core/context/process support
- Provides a collection of core debug services
- Uses platform specific low level debug agents
- Reference implementations
  - Windows
  - Linux
  - Symbian OS

EDC Overview



Eclipse Debug Platform
Flexible Debug Views and Actions

DSF Data Model

Launch Types
EDC provides basic launch support that is extended for each target platform

DSF Debug Services

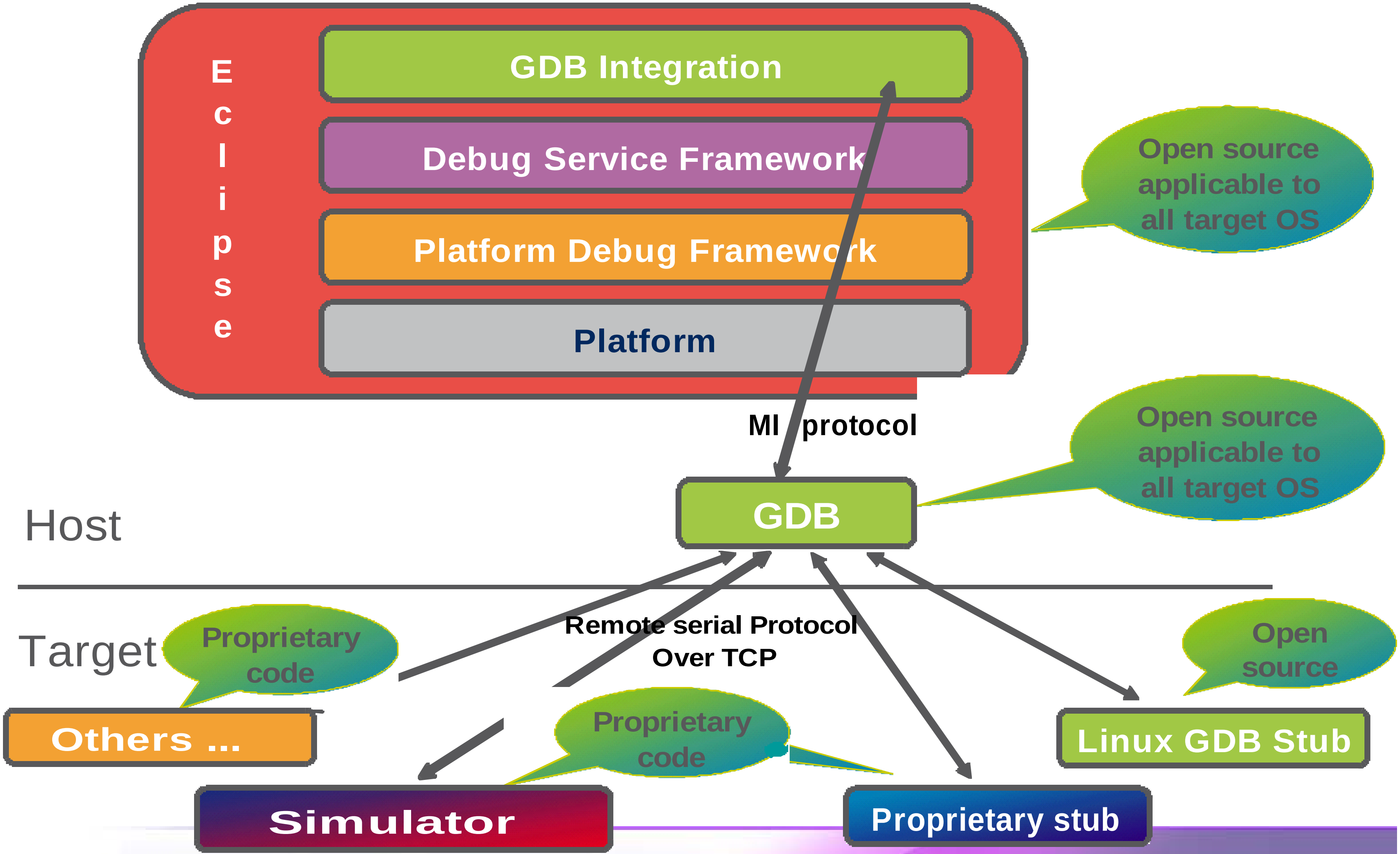
EDC Debug Services
Registers, Memory, Run Control, Breakpoints, Modules, Symbols, Expressions

TCF Service Proxies

EDC Low Level Debug Agents

TCF Message Handling, Decoding, Discovery

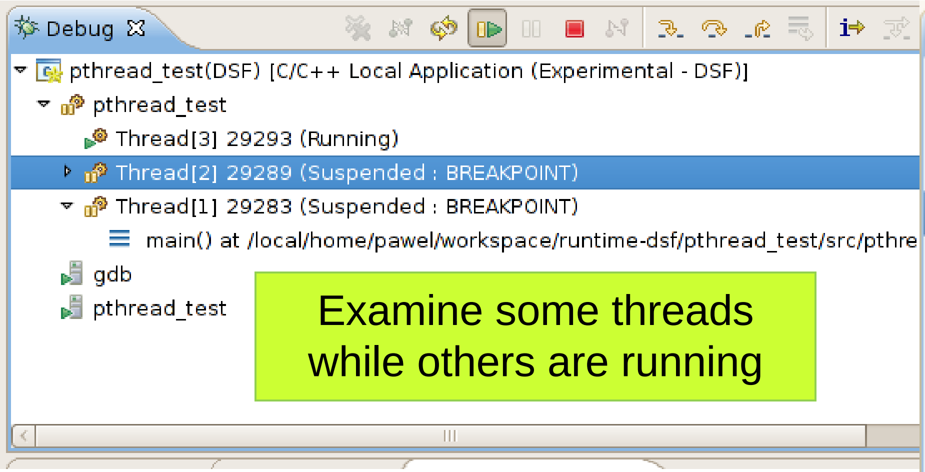
DSF-GDB Overview



DSF-GDB Overview

Default CDT debugger integration, advanced features

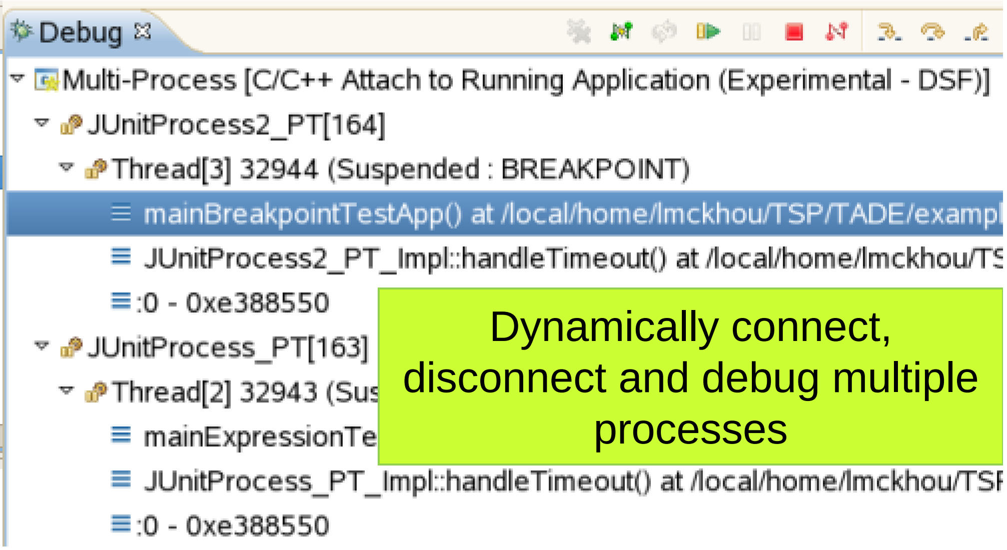
➢Non-stop debugging



pthread_test(DSF) [C/C++ Local Application (Experimental - DSF)]
pthread_test
Thread[3] 29293 (Running)
Thread[2] 29289 (Suspended : BREAKPOINT)
Thread[1] 29283 (Suspended : BREAKPOINT)
main() at /local/home/pawel/workspace/runtime-dsf/pthread_test/src/pthre
gdb
pthread_test

Examine some threads while others are running

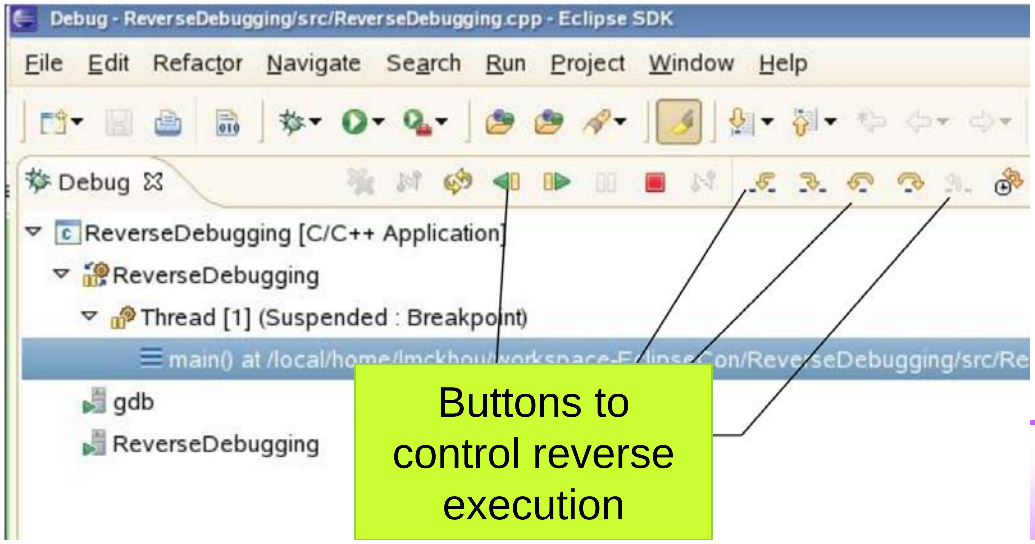
➢Multi-process debugging



Multi-Process [C/C++ Attach to Running Application (Experimental - DSF)]
JUnitProcess2_PT[164]
Thread[3] 32944 (Suspended : BREAKPOINT)
mainBreakpointTestApp() at /local/home/lmckhou/TSP/TADE/exampl
JUnitProcess2_PT_Impl::handleTimeout() at /local/home/lmckhou/TS
:0 - 0xe388550
JUnitProcess_PT[163]
Thread[2] 32943 (Sus
mainExpressionTe
JUnitProcess_PT_Impl::handleTimeout() at /local/home/lmckhou/TSF
:0 - 0xe388550

Dynamically connect, disconnect and debug multiple processes

➢Reverse debugging


Debug - ReverseDebugging/src/ReverseDebugging.cpp - Eclipse SDK
File
Edit
Refactor
Navigate
Search
Run
Project
Window
Help
Debug

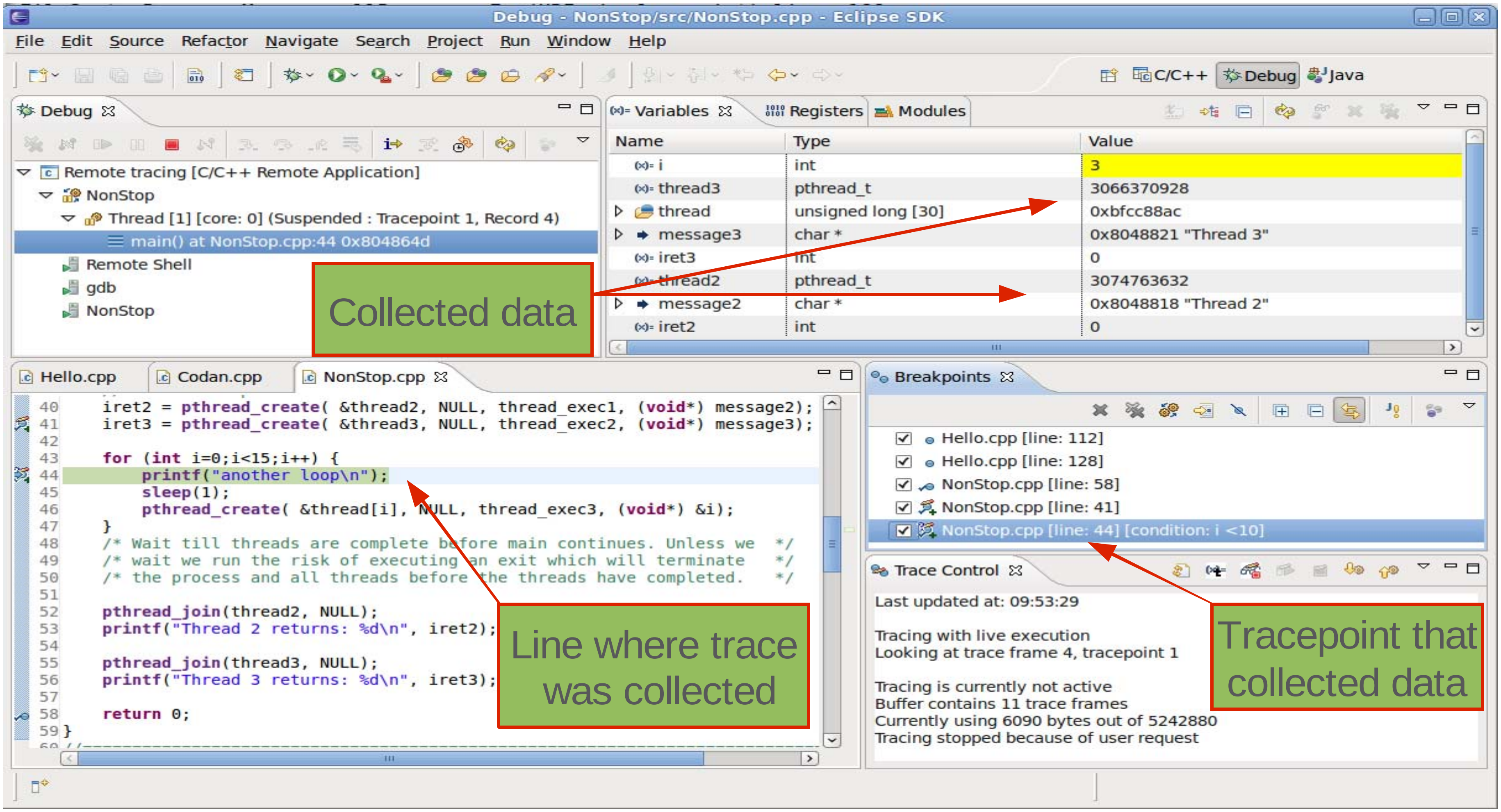
ReverseDebugging [C/C++ Application]
ReverseDebugging
Thread [1] (Suspended : Breakpoint)
main() at /local/home/lmckhou/workspace-EclipseCon/ReverseDebugging/src/Re
gdb
ReverseDebugging

Buttons to control reverse execution

- Limited and expandable stack length
- Fast single-stepping
- Complex objects pretty-printing
    - e.g. vector<vector<int>>

DSF-GDB Overview

- Debug Tracepoint


Debug - NonStop/src/NonStop.cpp - Eclipse SDK
File Edit Source Refactor Navigate Search Project Run Window Help
C/C++
Debug
Java
Debug ☒
Variables ☒
Registers
Modules
Hello.cpp
Codan.cpp
NonStop.cpp ☒
Breakpoints ☒
Trace Control ☒

- Remote tracing [C/C++ Remote Application]
  - NonStop
    - Thread [1] [core: 0] (Suspended : Tracepoint 1, Record 4)
      - main() at NonStop.cpp:44 0x804864d
  - Remote Shell
  - gdb
  - NonStop

Name	Type	Value
i	int	3
thread3	pthread_t	3066370928
thread	unsigned long [30]	0xbfcc88ac
message3	char *	0x8048821 "Thread 3"
iret3	int	0
thread2	pthread_t	3074763632
message2	char *	0x8048818 "Thread 2"
iret2	int	0

```
    iret2 = pthread_create( &thread2, NULL, thread_exec1, (void*) message2);
    iret3 = pthread_create( &thread3, NULL, thread_exec2, (void*) message3);

    for (int i=0;i<15;i++) {
        printf("another loop\n");
        sleep(1);
        pthread_create( &thread[i], NULL, thread_exec3, (void*) &i);
    }
    /* Wait till threads are complete before main continues. Unless we  */
    /* wait we run the risk of executing an exit which will terminate   */
    /* the process and all threads before the threads have completed.   */

    pthread_join(thread2, NULL);
    printf("Thread 2 returns: %d\n", iret2);

    pthread_join(thread3, NULL);
    printf("Thread 3 returns: %d\n", iret3);

    return 0;
}
```

- ☑ Hello.cpp [line: 112]
- ☑ Hello.cpp [line: 128]
- ☑ NonStop.cpp [line: 58]
- ☑ NonStop.cpp [line: 41]
- ☑ NonStop.cpp [line: 44] [condition: i <10]

Last updated at: 09:53:29

Tracing with live execution
Looking at trace frame 4, tracepoint 1

Tracing is currently not active
Buffer contains 11 trace frames
Currently using 6090 bytes out of 5242880
Tracing stopped because of user request

Collected data

Line where trace was collected

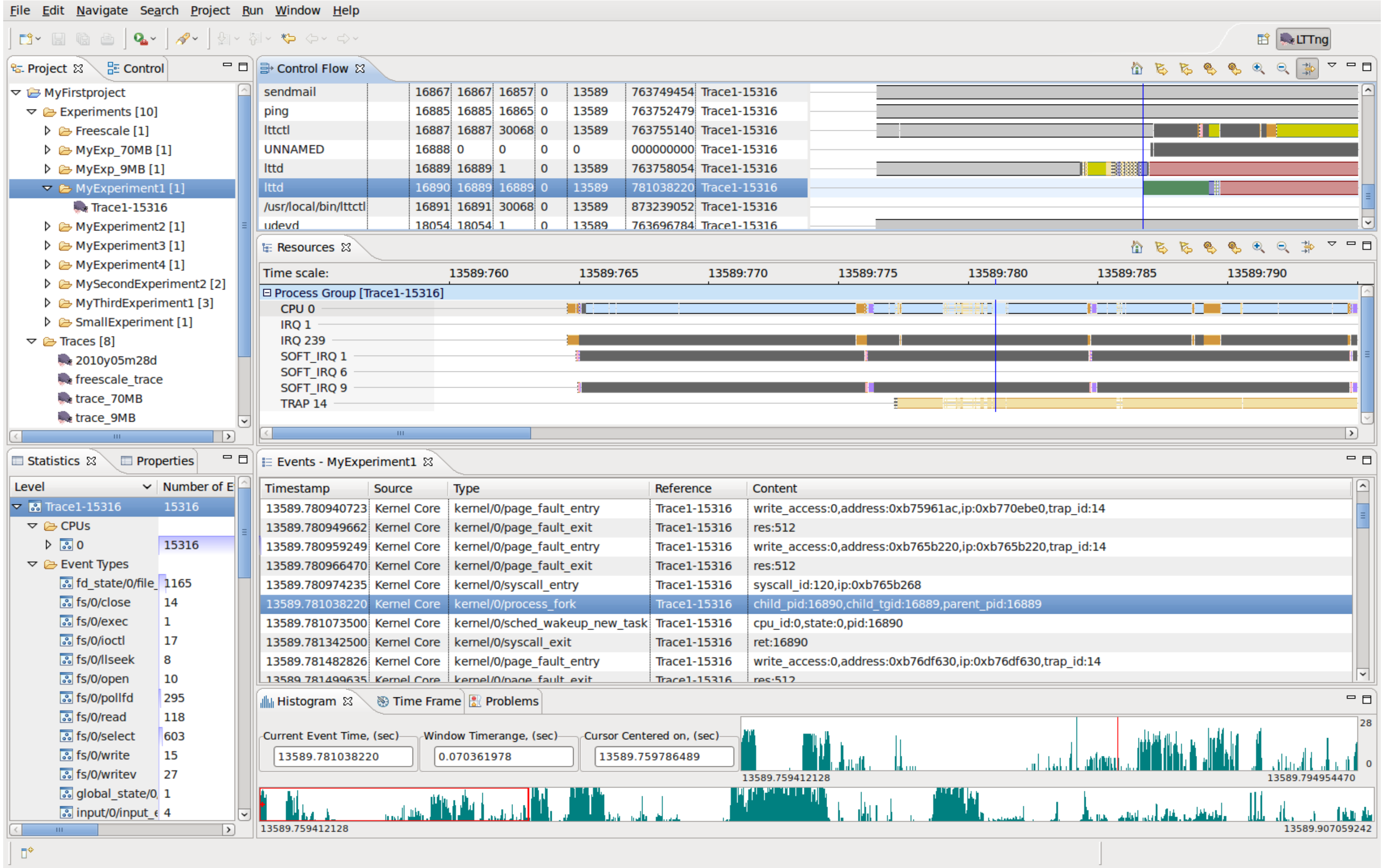
Tracepoint that collected data

- Multi-Architecture, Multi-Operating System -> target description

Tracing

- Observation can drastically change the behavior of what is being observed
- Tracing is a technique used to understand what is going on in a system without causing disturbance
- Compared to logging, tracing typically records lower-level events that occurs much more frequently
- Tracers must therefore be optimized to handle a lot of data while having a small impact on the system

Tracing



- MyFirstproject
  - Experiments [10]
    - Freescale [1]
    - MyExp_70MB [1]
    - MyExp_9MB [1]
    - MyExperiment1 [1]
      - Trace1-15316
    - MyExperiment2 [1]
    - MyExperiment3 [1]
    - MyExperiment4 [1]
    - MySecondExperiment2 [2]
    - MyThirdExperiment1 [3]
    - SmallExperiment [1]
  - Traces [8]
    - 2010y05m28d
    - freescale_trace
    - trace_70MB
    - trace_9MB

sendmail		16867	16867	16857	0	13589	763749454	Trace1-15316
ping		16885	16885	16865	0	13589	763752479	Trace1-15316
lttctl		16887	16887	30068	0	13589	763755140	Trace1-15316
UNNAMED		16888	0	0	0	0	000000000	Trace1-15316
lttd		16889	16889	1	0	13589	763758054	Trace1-15316
lttd		16890	16889	16889	0	13589	781038220	Trace1-15316
/usr/local/bin/lttctl		16891	16891	30068	0	13589	873239052	Trace1-15316
udevd		18054	18054	1	0	13589	763696784	Trace1-15316

Time scale: 13589:760 13589:765 13589:770 13589:775 13589:780 13589:785 13589:790

Process Group [Trace1-15316]
- CPU 0
- IRQ 1
- IRQ 239
- SOFT_IRQ 1
- SOFT_IRQ 6
- SOFT_IRQ 9
- TRAP 14

Level	Number of E
Trace1-15316	15316
CPUs	
0	15316
Event Types	
fd_state/0/file_	1165
fs/0/close	14
fs/0/exec	1
fs/0/ioctl	17
fs/0/llseek	8
fs/0/open	10
fs/0/pollfd	295
fs/0/read	118
fs/0/select	603
fs/0/write	15
fs/0/writev	27
global_state/0,	1
input/0/input_e	4

Timestamp	Source	Type	Reference	Content
13589.780940723	Kernel Core	kernel/0/page_fault_entry	Trace1-15316	write_access:0,address:0xb75961ac,ip:0xb770ebe0,trap_id:14
13589.780949662	Kernel Core	kernel/0/page_fault_exit	Trace1-15316	res:512
13589.780959249	Kernel Core	kernel/0/page_fault_entry	Trace1-15316	write_access:0,address:0xb765b220,ip:0xb765b220,trap_id:14
13589.780966470	Kernel Core	kernel/0/page_fault_exit	Trace1-15316	res:512
13589.780974235	Kernel Core	kernel/0/syscall_entry	Trace1-15316	syscall_id:120,ip:0xb765b268
13589.781038220	Kernel Core	kernel/0/process_fork	Trace1-15316	child_pid:16890,child_tgid:16889,parent_pid:16889
13589.781073500	Kernel Core	kernel/0/sched_wakeup_new_task	Trace1-15316	cpu_id:0,state:0,pid:16890
13589.781342500	Kernel Core	kernel/0/syscall_exit	Trace1-15316	ret:16890
13589.781482826	Kernel Core	kernel/0/page_fault_entry	Trace1-15316	write_access:0,address:0xb76df630,ip:0xb76df630,trap_id:14
13589.781499635	Kernel Core	kernel/0/page_fault_exit	Trace1-15316	res:512

Current Event Time, (sec): 13589.781038220

Window Timerange, (sec): 0.070361978

Cursor Centered on, (sec): 13589.759786489

13589.759412128 13589.794954470

13589.759412128 13589.907059242

CDT Futures

- Better support for popular frameworks like Qt
- Clean up the menus and clutter in the UI
- Flexible Projects
- Multi-core debug working group, conference call
  http://wiki.eclipse.org/CDT/MultiCoreDebugWorkingGroup
  http://wiki.eclipse.org/CDT/designs/MultiCoreDebug
  http://wiki.eclipse.org/PinAndClone
- Tracing and profiling framework with the Eclipse LinuxTools project
  http://www.eclipse.org/linuxtools/
- Advanced C/C++ Debugging and Tracing at Eclipse Summit
  Tomorrow at 15:00 in room Silchersaal