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Overview

This pictorial guide describes a basic Cygwin configuration for building and debugging generated Papyrus-RT model projects. The developer should be familiar with generating Papyrus-RT model projects, and a basic understanding of Cygwin and CMake. This document does not address installation procedures nor provide methods for troubleshooting related code generation and build issues.

Requirements

The steps below depend on the following Windows configuration:

- The Neon developer environment for Papyrus-RT
- A current 32-bit installation of Cygwin including CMake and related dev packages
- The PingPong project tutorial

Steps

1. Setup required directories

The generated CDT project requires an additional build directory, and a symlink to the RTS root directory. The additional *build* directory has no particular naming constraints. The symlink, however, should be named *umlrt.rts* to avoid the necessity of undocumented configuration changes. For example:



2. Create an external CMake tool

CMake will be executed in the context of Cygwin. The following tool configuration shows how this can be accomplished as a one-line command. The Working Directory specifies the build directory created in the previous step. For clarity, the arguments to *bash*:

-c 'cmake -G "Unix Makefiles" ...'

External Tools Configurations

Create, manage, and run configurations

Run a program

□ 🗊 🗶 🖻 🐡 🕶	Name: cmake via cygwin	
│ ∦ Ant Build	Main & Refresh Buil	d 🖾 Environment 🔲 Common
@ API Use Report	C:\cygwin\bin\bash.exe	
Program Q cmake via cygwin		Browse Workspace Bro
	Working Directory:	
	\${project_loc}/src/build	
		Browse Workspace Bro
	Arguments:	
	-c 'cmake -G "Unix Makefiles"	94 19

In cases where Cygwin's bin is excluded from the session path, the Path parameter can be updated as shown below. The recommended character case and value for the Path variable is as follows:

Path => C: \cygwin\bin; \${env_var: Path}

External Tools Configurations		
Create, manage, and run conf Run a program	igurations	
Image: Image	Name: cmake via cy	gwin Build 🔀 Environment 🔲 Common
 @ API Use Report Program Cmake via cygwin 	Variable Path	Value C:\cygwin\bin;\${env_var:Path}

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3. Generate the CMake structure

With the CDT project focused, run the *cmake via cygwin* external tool to generate the CMake artifacts. The CMake results can be viewed in the Console window:

Dephame @ Invador @ Declaration E Concolo
<terminated> cmake via cygwin [Program] C:\cygwin\bin\bash.exe</terminated>
Detecting C compile features - done
Check for working CXX compiler: /usr/bin/c++.exe
Check for working CXX compiler: /usr/bin/c++.exe works
Detecting CXX compiler ABI info
Detecting CXX compiler ABI info - done
Detecting CXX compile features
Detecting CXX compile features - done
RTS root: /cygdrive/c/Users/William/papyrus-rt-master/runtime-PapyrusRT/P
Looking for sys/socket.h
Looking for sys/socket.h - found
Looking for include file pthread.h
Looking for include file pthread.h - found
Looking for pthread_create
Looking for pthread_create - found
Found Threads: TRUE
Looking for pthread_mutex_timedlock in pthread
Looking for pthread_mutex_timedlock in pthread - not found
Configuring done
Generating done
Build files have been written to: /cygdrive/c/Users/William/papyrus-rt-mag

Refresh the build folder to see the artifacts:



4. Verify the CDT Project's Toolchain

Make sure *Cygwin GCC* is the project's active toolchain.

oe filter text	Tool Chain Editor
Resource Builders C/C++ Build Build Variables	Configuration: Default [Active]
Logging Settings Tool Chain Editor	☑ Display compatible toolchains only Current toolchain: Cygwin GCC
C/C++ General OCL Papyrus Project References Run/Debug Settings	Current builder: Gnu Make Builder

1/11 timerDool - timerDool ·

type filter text	Environment		
 Resource Builders C/C++ Build Build Variables 	Configuration:	Default [Active]	
Logging Settings	Environment va	ariables to set	
Tool Chain Editor	Variable	Value	Origin
> C/C++ General	CWD	C:\Users\William\papyr	BUILD SY
> OCL	CYGWIN_HO	ME C:\cygwin	USER: CO
> Papyrus	LANG	C.ISO-8859-1	BUILD SY
Project References	PATH	\${CYGWIN_HOME}\bin;	BUILD SY
Refactoring History Run/Debug Settings	PWD	C:\Users\William\papyr	BUILD SY

5. Update the Make Target

Select the Makefile generated by CMake and create the Make Target, *all*. The dialog is available via the context menu, Make Targets / Build...

 PringPong_CDTProject 	ce	: r: PingPong_CDTProject/src/	«RTPseudost «RTPsetostate» Initial1	tate» ini
 PingPong.cc PingPong.hh Ponger.cc Ponger.hh Top.cc Top.hh TopControllers.cc TopControllers.hh TopMain.cc CMakelists.txt Makefile Top-connections.log 	Target	Location Create Make Target Target name: all Make Target Make Target Same as the target na Make target: all Build Command Use builder settings Build command: make	ame	
 Model Explorer ☆ ➢ PingPong ➢ «ModelLibrary» Ecore Primitive ☆ «EPackage, ModelLibrary» UM ➢ ≪ ModelLibrary» UMLRT-RTS 	E E K I	Build Settings ☑ Stop on first build en ☑ Run all project builde	ror ers OK Cance	

6. Build the CDT Project

Select the target, *all*, and run the build.

> rts-prefix cmake_ins CMakeCac	tall.cmake :he.txt		Initia
Winderne	Make Targets Make Targets for: Pir	aPona CDTProject/src/build	×
 PingPong.hh Ponger.cc Ponger.hh Top.cc Top.hh TopControlle TopControlle TopMain.cc CMakelists.tx Makefile Top-connecti 	Target (a) all	Location	Add Remove Edit

The build results can be viewed in the Console window:

```
[100%] Linking CXX static library librtsd.a
[100%] Built target rts
Install the project ...
-- Install configuration: "Debug"
-- Installing: /cygdrive/c/Users/William/papyrus-rt-master/runtime
[ 53%] Completed 'rts'
[ 53%] Built target rts
Scanning dependencies of target TopMain
[ 60%] Building CXX object CMakeFiles/TopMain.dir/TopMain.cc.o
[ 66%] Building CXX object CMakeFiles/TopMain.dir/PingPong.cc.o
[ 73%] Building CXX object CMakeFiles/TopMain.dir/Pinger.cc.o
[ 80%] Building CXX object CMakeFiles/TopMain.dir/Ponger.cc.o
[ 86%] Building CXX object CMakeFiles/TopMain.dir/Top.cc.o
[ 93%] Building CXX object CMakeFiles/TopMain.dir/TopControllers.c
[100%] Linking CXX executable TopMain.exe
[100%] Built target TopMain
22:48:52 Build Finished (took 1m:1s.668ms)
```

7. Setup a Debug Configuration

Create a C/C++ Application configuration. Select TopMain.exe if prompted.

	Local Application		~
hor	ose a local application to debug		
	use a local application to debug		
_			
Sina	ries:		
莽	a.exe		
莽	CMakeDetermineCompilerABI_C.bin		
莽	CMakeDetermineCompilerABI_CXX.bin	í.	
莽	feature_tests.bin		
芬	TopMain.exe		
Jual	ifier.		
Qual	ifier:		
کر کر	ifier: x86le - /PingPong_CDTProject/src/build	d/TopMa	in.exe
)ual 参	ifier: x86le - /PingPong_CDTProject/src/build	d/TopMa	in.exe
Qual	ifier: x86le - /PingPong_CDTProject/src/build	d/TopMa	in.exe
Qual 🕸	ifier: x86le - /PingPong_CDTProject/src/build	d/TopMa	in.exe
Qual	ifier: x86le - /PingPong_CDTProject/src/build	d/TopMa	in.exe
Qual 莎	ifier: x86le - /PingPong_CDTProject/src/build	d/TopMa	in.exe
Qual 🕸	ifier: x86le - /PingPong_CDTProject/src/build	d/TopMa	in.exe

Update the Path variable required to locate Cygwin DLLs.

 Debug Configurations Create, manage, and run configurations (Main): Program does not exist 	urations	
Image: Second system Image: Second system type filter text C C/C++ Application	Name: TopMain.exe Main (x)= Argum Environment variable	nents 📧 Environment 🛛 🕸 Debugger 🤤 Source 🔲
 C TopMain.exe C/C++ Attach to Application C/C++ Postmortem Debugger C/C++ Remote Application Eclinee Application 	Variable Path	Value c:\cygwin\bin;\${env_var:Path}

8. Debug the Modeled Application

Set a breakpoint at the beginning of main, and start debugging.

🤿 Pi	ngPong.di	.c Top.cc	͡c TopMain.cc ⊠
12	static	UMLRTSignalEle	mentPool signalElementPoo
13			
14	static	UMLRTMessage m	essageBuffer[USER_CONFIG_
15	static	UMLRTMessagePo	ol messagePool(messageBu
16			
17	static	UMLRTTimer tim	ers[USER_CONFIG_TIMER_POO
18	static	UMLRTTimerPool	timerPool(timers, USER
19			
200	int main	n(int argc, c	har * argv[])
●21	{	- T	17452-7 B
22	UMLI	RTController::	initializePools(&signalE
23	UMLI	RTMain::setArg	s(argc, argv);
24	UMLI	RTCapsuleToCon	trollerMap::setDefaultSlo
25		Constraint of the second se	

The initial debug session may ask for the location of the source. Navigate to the source file using *Locate File*...

🤿 PingPong.di	.c Top.cc	C TopMain.cc	🖸 main() at TopMain.cc:22 0x4011de 🛛	
Can't find a sourc	e file at "/cygdri edit the source lo	ve/c/Users/William/p pokup path to includ	papyrus-rt-master/runtime-PapyrusRT/PingPong_CDTProject/src/TopMa e its location.	in.cc"
View Disassembly	/			
Locate File				
Edit Source Look	up Path			

The RTS library can be stepped into as shown:



The results:

📮 Console 🔀	🖉 Tasks 📳 Problem	ns 🔘 Executables	Memory
TopMain.exe [C/C++ Application] TopMain.exe			
Controller " Ping sent! Pong sent!	DefaultController"	running.	