Version 1.1
Porting Guide to Certification

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Porting Guide to Certification
Agenda

Version 1.1 Topics

- Overview of Version 1.0 Issues
- Fundamental Concepts Defining Version 1.1
- Source Tree Standards for All Applications
- Test Harness Regular and Lite
- Developer Environments
- Porting and Certification

Porting Guide to Certification *Overview*

Porting/Certification is a Manual Process

- High Initial Development Cost
- Low Maintenance Cost
- Custom makefiles, no examples or tools
- Microsoft Visual C++ IDE Workspace Example
- Original Developers often Unavailable

eCL Certified!
Benchmarks Certified by ECL, an Independent Testing, Analysis, and Verification Company
http://www.ebenchmarks.com

Benchmark Source Tree Aging

- All Applications have
  - Different Harnesses, Different File/Directory Conventions
  - Compiler Warnings and Errors require Code changes
- 120 Open Bugs, Barriers to closure, Declining Activity

Version 2 is COMING. This is OUR Foundation.

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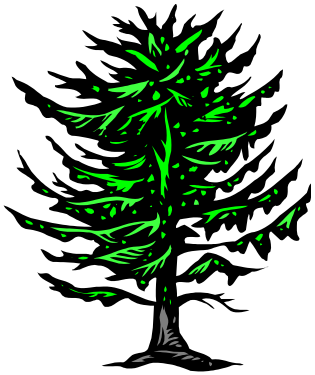
Fundamental Concepts

With several years experience...

- Add relevant Developer Environments
- Enhance support for Certification
- Modernize tools, Remove barriers to cc,gcc (ANSI C)

Repair and Share Tools

- Makefile from Office
- TH Lite with CRC from 8-16 Bit
- TH Regular and Makerule.pl from Networking
- Verification from Telecom



Restore Source Tree

- Standard Directories, File Names
- Top down build of all benchmarks

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Source Tree Standards

All File and Directory Names Lowercase

- Removes Unix/Windows naming problems

Standard Test Harness in Each Application

- TH Regular -> th, TH Lite -> th_lite
  - Application Layer - al
  - Functional Layer - src

Standard Empty Benchmark in Each Application

- Builds Lite and Regular Versions using ported harness

Standard Utilities in Each Application

- Toolchain definition, Data Collection, Makefile Dependencies

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Source Tree Standards

Benchmark File Names

- TH Regular -> bmark.c
- TH Lite -> bmark_lite.c

VC++ Workspace Files

- One per application using application name
- World make workspace named makeworld.dsw

VC++ Project Files

- Two per benchmark TH Regular -> <benchmark>.dsp, TH Lite <benchmark>_lite.dsp
- IDE intermediate files in a sub-directory below the benchmark source.
- win32 used for Visual C++

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Source Tree Standards

Compiler Include Path Required

- No path names in source code

Documentation

- May reside at any level in directory -> doc

Makefile builds

- A single makefile at application root
- Files included by makefile have filetype -> <xxx>.mak
- Intermediate files in directories at application root level.

Test Harness Output

- Output files from harness have filetype -> <xxx>.log

Simple Changes Allow Global Build, Run, Results Collection

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Test Harness Regular and Lite

Starting Point for TH Regular

- THV32E1 was the Standard
- All applications evolved with variations
- Multiple compiler warnings, bugs, and inconsistencies
- Networking had initial version 3.3
  - Initial work was good, but didn't work outside Networking or build under Windows

Starting Point for TH Lite

- th_lite developed as the Standard, no CRC
- 8-16 Bit had own TH Lite, with CRC
- Partial ports of Consumer and Telecom from Sergei Larin
- ARM Project with Patrick Webster

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Test Harness Regular and Lite

TH Lite Project

- Completed Consumer and Telecom
- Propagated to other Applications
  - Required enhancements for each application
  - Enhancements rolled back to all other applications
- Enhancements derived from TH Regular when available.

Benchmark Changes

- Non Intrusive CRC Check for each Benchmark
  - 8-16 bit excluded, but standard filenames applied.
- Started standard file naming and comment blocks.
- Avoided changes within Algorithms

Demonstrated Feasibility of Standard TH Lite

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Test Harness Regular and Lite

TH Regular Continuation

- Repaired Windows Build
- Implemented in all other applications.
- Code changes rolled back to all applications
- Common eembc_dt.h, and thcfg.h

Timing Tests

- Match TH Regular - TH Lite
- Compare TH Regular V1.0 - TH Regular V1.1
- Testing all changes to <1% timing difference

A Standard TH for All Applications

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Developer Environments

Two Classes of Developers

- Integrated Development Environment (IDE)
- Makefile

IDE Users

- Initial testing and checkout compile
- Profiling, Interactive Debug, Tuning, Optimization

Makefile Users

- Automate build/run/data collection
- Quickly apply and measure changes to all benchmark
- May be only environment for Unix Hosts, Target RTOS

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IDE Development

Traditional Microsoft Visual C++

- New Workspace makeworld.dsw
  - Builds All Benchmarks For All Applications
    - one click verification of a Release
- New Application Workspaces
  - Build all Benchmarks within Application
- Unique Project Names, consistent directory structure

Multiple IDE Tool Chains

- Consistent win32 directory for IDE example
- Code moved from win32 to Benchmark root
- New IDE, Sub-Directory at each benchmark.

The Visual C++ Example now models top down build with IDE

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Makefile Development

New Support for Gnu C

- Cygwin used for unified Windows/Unix Build
- All benchmarks compiled with -ansi -pedantic
  - Possible to port without code changes

New Batch files and Scripts

- Build, Run, and Collect Results for Certification
- Windows and Unix without changes

Multiple Tool Chains

- Create a simple definition file
- All benchmarks build with new tool chain
- Visual C++ support for makefile environment included

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Makefile Development

Perl, Awk, and uudecode utilities

- Automatically generate complex dependency files
- Extract Timing data from Test Harness output.
- Extract Verification Files from Test Harness output

Makefile Includes for Adaptation

- Tools, Directories, Compile/Link Targets, Run, and Results
- Each can be independently customized

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Porting Abstractions

- Abstractions for Porting
  - Platform/Processor
  - Compiler/Tool Chain
  - Subcommittees
  - Test Harness
    - Abstraction Layer
    - Functional Layer

Porting Guide to Certification Build Process - V1.1 Beta 1C

- Makefile Control
  - Tools Definitions
  - Compile
    - DIRS
    - TARGETS
  - Execution
    - RUN
  - Analysis
    - RESULTS

Porting Guide to Certification Build Process - V1.1 Beta 2

- Tools Control
- Makefile
  - Tools Definitions
    - Compile
      - DIRS
      - TARGETS
        - ITERATIONS (optional)
    - Execution (optional)
      - RUN
        - ITERATIONS (TH Regular optional)
    - Analysis (optional)
      - RESULTS

Porting Guide to Certification Source Tree - V1.1 Beta 1C

- Subcommittee
  - Benchmarks
  - util
    - make
      - Platform/Processor
      - Compiler/Tool Chain
    - awk
      - Results Processing
  - th
    - al - Abstraction Layer
    - src - Functional Layer

Porting Guide to Certification Source Tree - V1.1 Beta 2

- Subcommittee
  - Benchmarks
- util
  - make
    - Platform/Processor
    - Compiler/Tool Chain
  - awk
    - Results Processing
- th
  - <tools>
    - al - Abstraction Layer
  - src - Functional Layer

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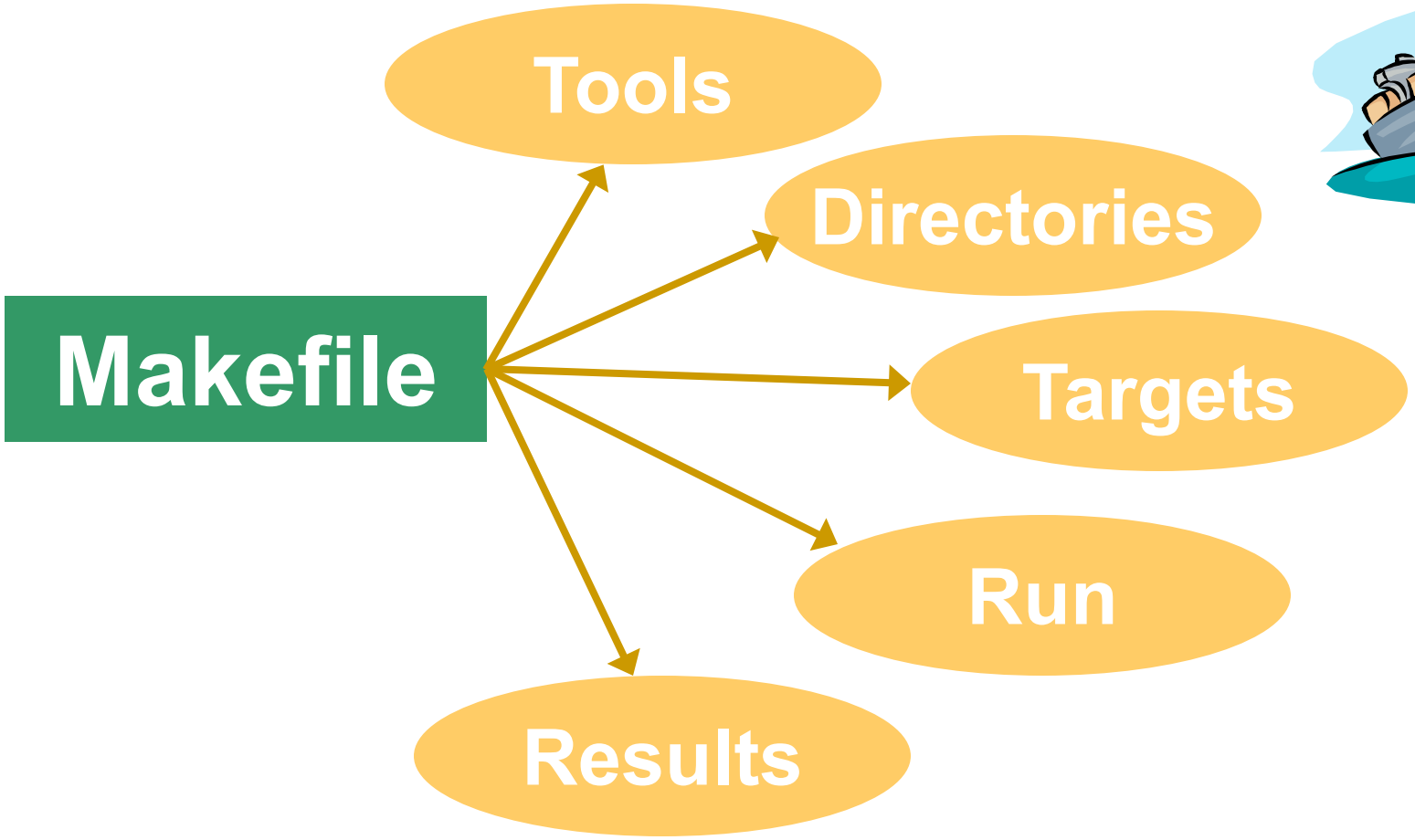
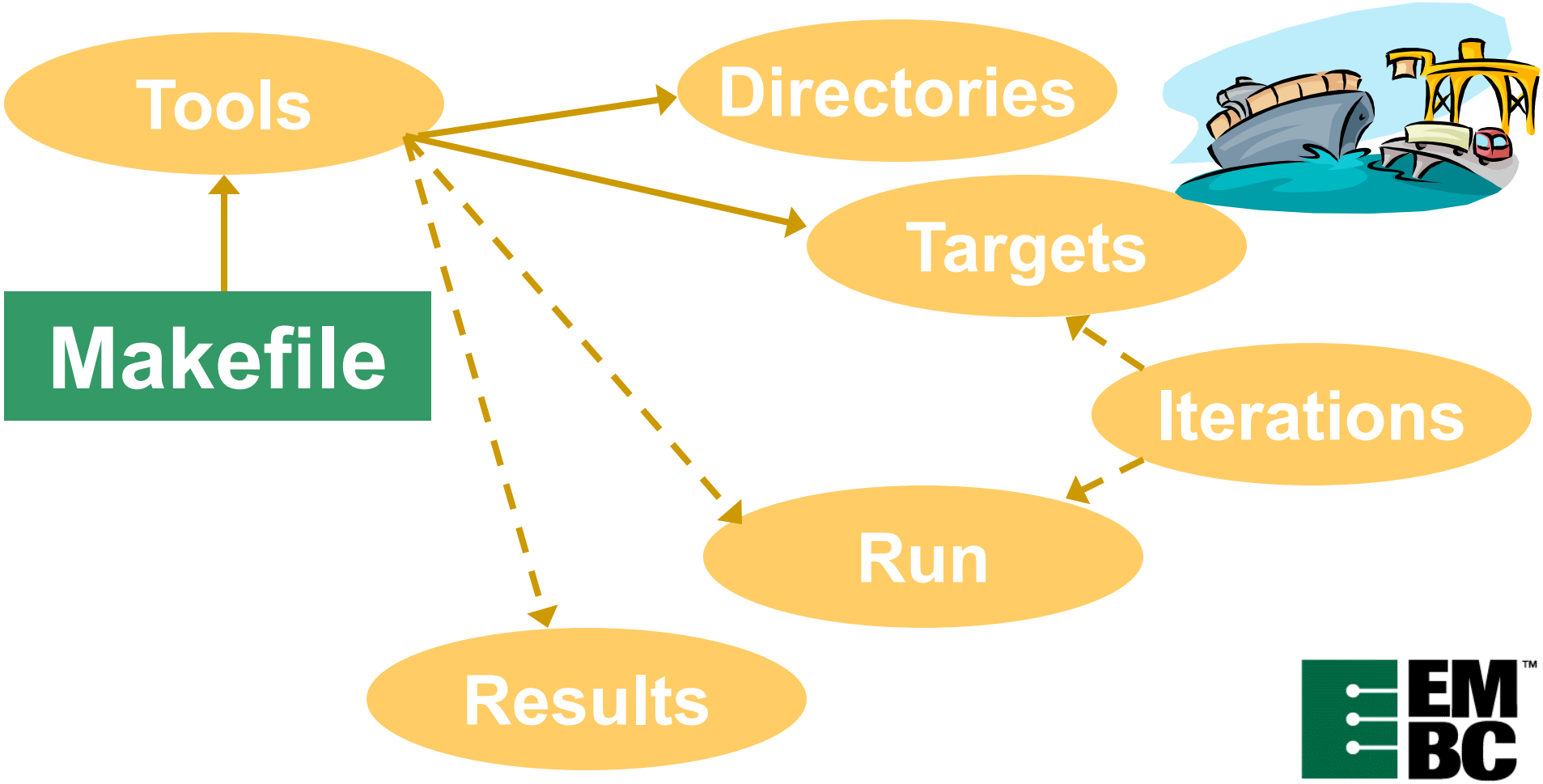
Porting - V1.1 Beta 1C



Porting Guide to Certification Porting - V1.1 Beta 2



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Porting

Tools

Tool Chain Definition File

<toolchain>.mak in util/make

Definitions

- Path to tools
- Compiler, Options, and object file type
- Assembler and Options
- Linker, Options, and Executable file type
- Run, command to execute Benchmark

Makefile Variable

TOOLCHAIN=util/make/<toolchain>.mak

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Directories

- Directory Definition File
  - dirs.mak
- Commands to create and remove Directories
  - Object Files, Regular and Lite
  - Executable files
  - Results files

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Targets

Targets Definition File

depgen.cml

Makerule.pl scans C files generating targets.mak

Makefile ensures targets.mak is up to date

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Run

Execution definition file

- run.mak

Commands to run, and size Benchmark

- Direct execution, or via program defined in Tools
- TH Output re-directed to log file
- Size information re-directed to separate log file

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Results

Results definition file

- results.mak

Commands to extract Timing and Size information

- AWK script for Timing provided
- Custom script for sizing, dependant on tool chain format

Results are stored in log file at top of application

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Certification

Wherever your starting point, Version 1.1 provides a new foundation for certification

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