Compilers

Introduction

Agenda

- Documentation
- Compiler naming and default setting

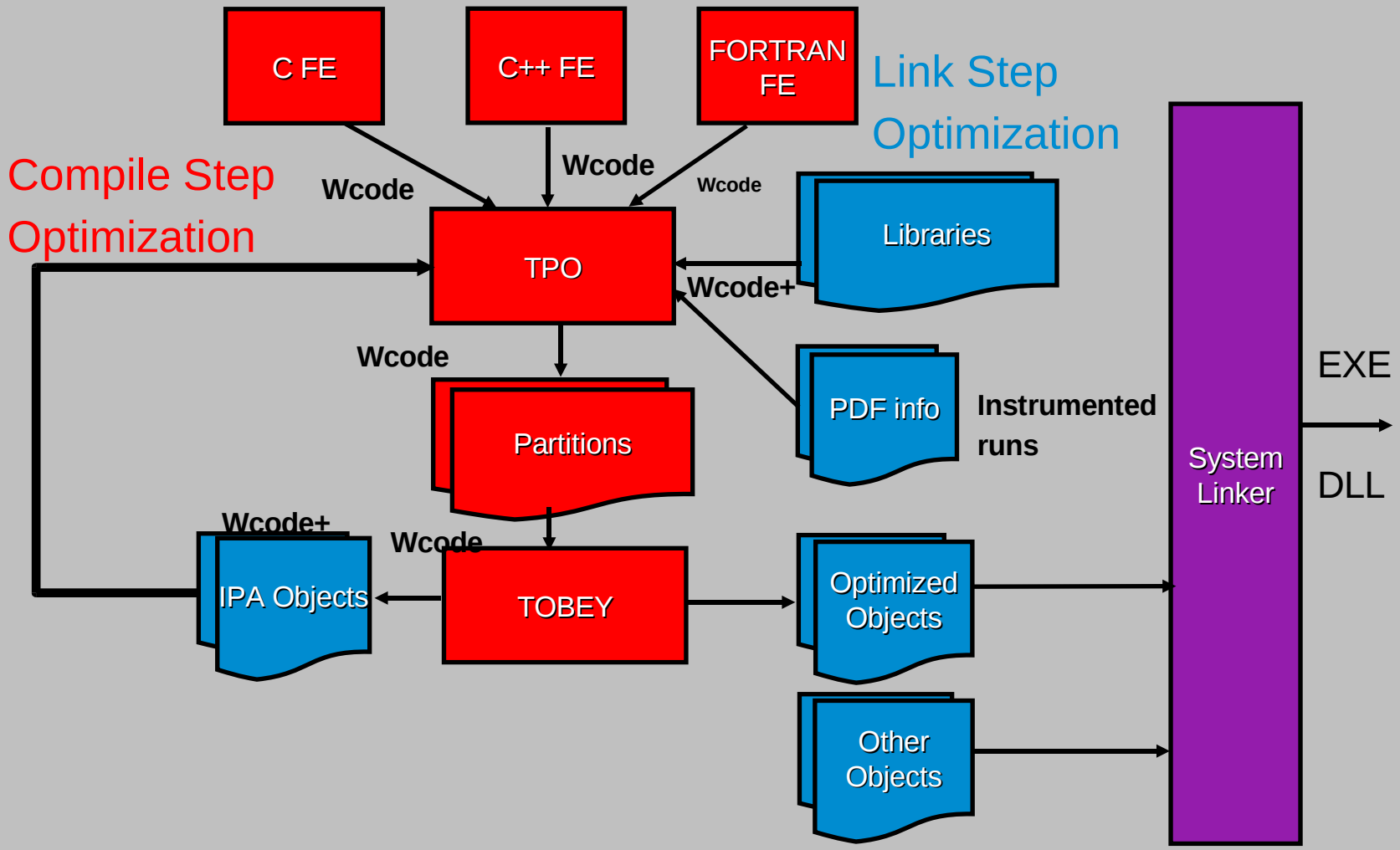
XLF Fortran Documentation

1. Installation Guide - XL Fortran Enterprise Edition V10.1 fo
2. Getting Started - XL Fortran Enterprise Edition V10.1 for A
3. Language Reference - XL Fortran Enterprise Edition V10.1
4. Compiler Reference - XL Fortran Enterprise Edition V10.1
5. Optimization and Programming Guide - XL Fortran Enterp

(and many similar volumes for C, C++, and Linux)

6. Readme File - XL Fortran Enterprise Edition V10.1 for AIX

IBM XL compiler architecture



Compiler Document on Your Systems

Compiler	Document location
C	/usr/vac/pdf/en_US
C++	/usr/vacpp/pdf/en_US
xlf	/usr/lpp/xlf/pdf

	C	C++	xlf
Language Reference	language.pdf	language.pdf	lg.pdf
Compiler Reference	compiler.pdf	compiler.pdf	ug.pdf
Debugging	debug.pdf	debug.pdf	

The “man” page

$ man xlf – this one works!

$ man xlC – I did not find man page

Compiler document on the Internet

- www.software.ibm.com/
  - → Products A-Z
    - → X
      - XLFORTRAN
      - XLC/C++
- Editions:
  - Linux on pSeries
  - AIX
  - MAC OS X
  - Blue Gene
- Many IBM customers place IBM document on line and it's often easier to find those
  - www.google.com

IBM Compiler Names

Compiler	Command	Name
C	xlc	xlc and Visual Age C (vac)
C++	xlC	xlC and Visual Age C++ (vacpp)
FORTRAN	xlf, xlf90, xlf95	XL FORTRAN

There are a lot more, including fort77, cc99_128, xlc128_r7…

AIX Compiler Versions

	C	C++	Fortran
Versions	6.0, 7.0, 8.0	6.0, 7.0, 8.0	8.1, 9.1, 10.1
Standards	Extended ANSI C	ANSI C++	Fortran 77 Fortran 90 Fortran 95
Latest Release	2006	2006	2006
Installations	/usr/vac	/usr/vacpp	/usr/lpp/xlf

How to identify the compiler version?

$ lslpp –l | grep xlf

$ lslpp –l grep xlC

C Compiler Invocations

Language	Sequential	Reentrant (for SMP)	Message Passing
ANSI C++	xlC	xlC_r	mpCC
ANSI C	xlc	xlc_r	mpcc
Extended	cc	cc_r	

Two C compilers:

- **C and C++**
- **C is a subset of C++**

Fortran Compiler Invocations

Language	Sequential	Reentrant (for SMP)	Message Passing
Fortran 77	xlf	xlf_r	mpxlf
Fortran 90	xlf90	xlf90_r	mpxlf90
Fortran 95	xlf95	xlf95_r	mpxlf95

One fortran compiler.
Multiple invocations.

xlf_r and mpxlf Example: Hello, World

```
program hello

print *,   Hello, World
end
```

```
% xlf_r  hello.f –l hello      <<< using xlf_r
% hello
Hello, World
```

```
% mpxlf hello.f –l hello      <<<< using mpxlf
% hello
ERROR:  0031-808  Hostfile or pool must be used to request nodes
% hello –procs 4 –hostfile hostfile
Hello, World
Hello, World
Hello, World
Hello, World
```

mpxlf will enable the binary to run in SPMD mode across multiple CPUs

Fortran Compiler Configuration File /etc/xlf.cfg

```
...

* Fortran 90 compiler
xlf90:    use          = DEFLT
          libraries    = -lxlf90,-lxlopt,-lxlf,-
  lxlomp_ser,-lm,-lc
          proflibs     = -L/lib/profiled,-
  L/usr/lib/profiled
          options      =
  -qxlf90=noautodealloc:nosignedzero,-qfree=f90


* Alias for original Fortran compiler
f77:    use          = DEFLT
          ..
          options      = -qnozerosize,-qsave,-
  qalias=intptr,-qposition=appendold,-
qxlf90=noautodealloc:nosignedzero,-
  qxlf77=intarg:intxor:persistent:noleadzero:ge
dit77:noblankpad:oldboz:softeof
...
```

C Compiler Configuration File /etc/vac.cfg

```
...

* ANSI C compiler, UNIX header files
xlc:  use          = DEFLT
        crt        = /lib/crt0.o
        mcrt       = /lib/mcrt0.o
        gcrt       = /lib/gcrt0.o
        libraries  = -L/usr/lpp/xlopt,-
  lxlopt,-lc
        proflibs   = -L/lib/profiled,-
  L/usr/lib/profiled
        options    = -qansialias

* C compiler, extended mode
cc:   use          = DEFLT
        …
        options    = -qlanglvl=extended,-
  qnoro,-qnoroconst...
```

Environment Variables

- LANG=en_US
- NLSPATH=/usr/lib/nls/msg/%L/%N:/usr/lib/nls/msg/%L/%N.cat

- For AIX
  - Libxlf90.a should be at /usr/lib or set the path:
  - LIBPATH = /my_xlf90_lib_path:/usr/lib
- Fox Linux, the path should be
  - LD_LIBRARY_PATH=/usr/lib
  - You may also need LD_RUN_PATH= runtime library search path

Fortran Compiler Defaults

Compiler	Options	Source Format	Storage
$(FC)	$(FFLAGS)	-q{fixed|free}	-q{save|nosave}
xlf77	-qnoopt	-qfixed	-qsave
xlf90	-qnoopt	-qfree	-qnosave

Many compiler options have prefix “-q”

xlf Version 10.1

- New allowable extensions:
  - .f77
  - .f90
  - .f95
- Traditional allowable extentions:
  - .f
  - .F (will pass through cpp before compiling)