Babel 0.8.0 Release

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Summary of new features & changes

- Initial F90 support
- SIDL backend
- Reentrant & unversioned packages
- New version syntax
- Usability improvements
- IOR additions
- Infrastructure changes

Initial Fortran 90 support

Recall that a minimalist approach was taken for quicker turn-around.

Feature	F77	F90	Comment
File extension	.f	.F90	Standard
Format	Fixed	Free	Although F90 handles both, the Impls are generated in free-form
Comment style	C	!	
Subroutine termination	end	end subroutine	
Use statement	---	New splicer block	
Subroutine name lengths	---	31 characters	Name mangling is employed

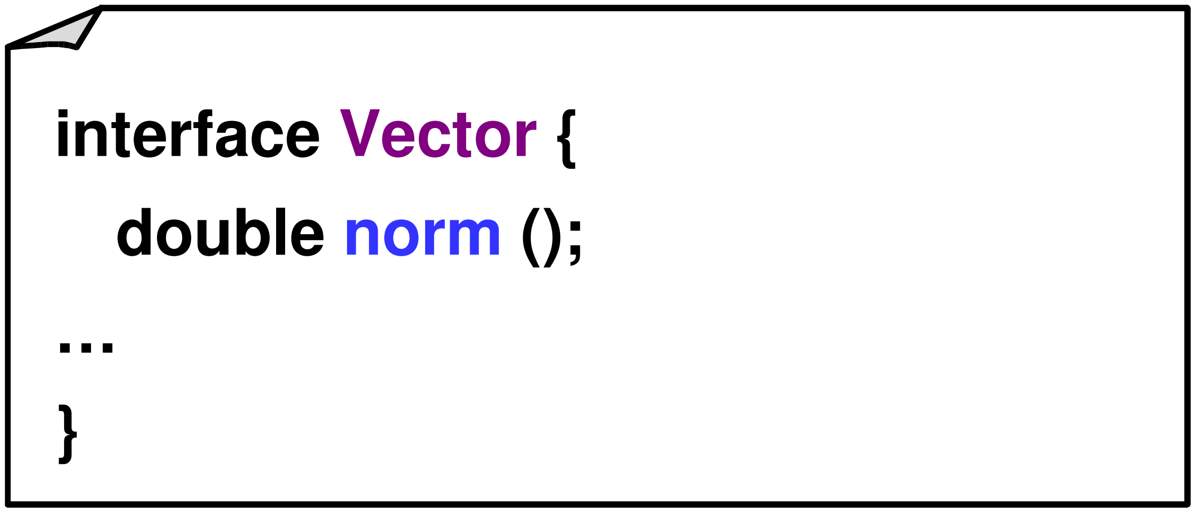
There have been a few changes since we last met.

- F90 binding changed to exploit use of *kind*
- Complete set of F90 regression tests (like F77’s)
- Build system modified
  - using “standard” autoconf macros for F90/F95
  - Automake 1.7.1 (includes macro name fix)
  - GNU m4-1.4q (includes overflow fix)

Modifying the build to support F90 required coordination with GNU tools developers to get necessary fixes.

- User’s Guide updated

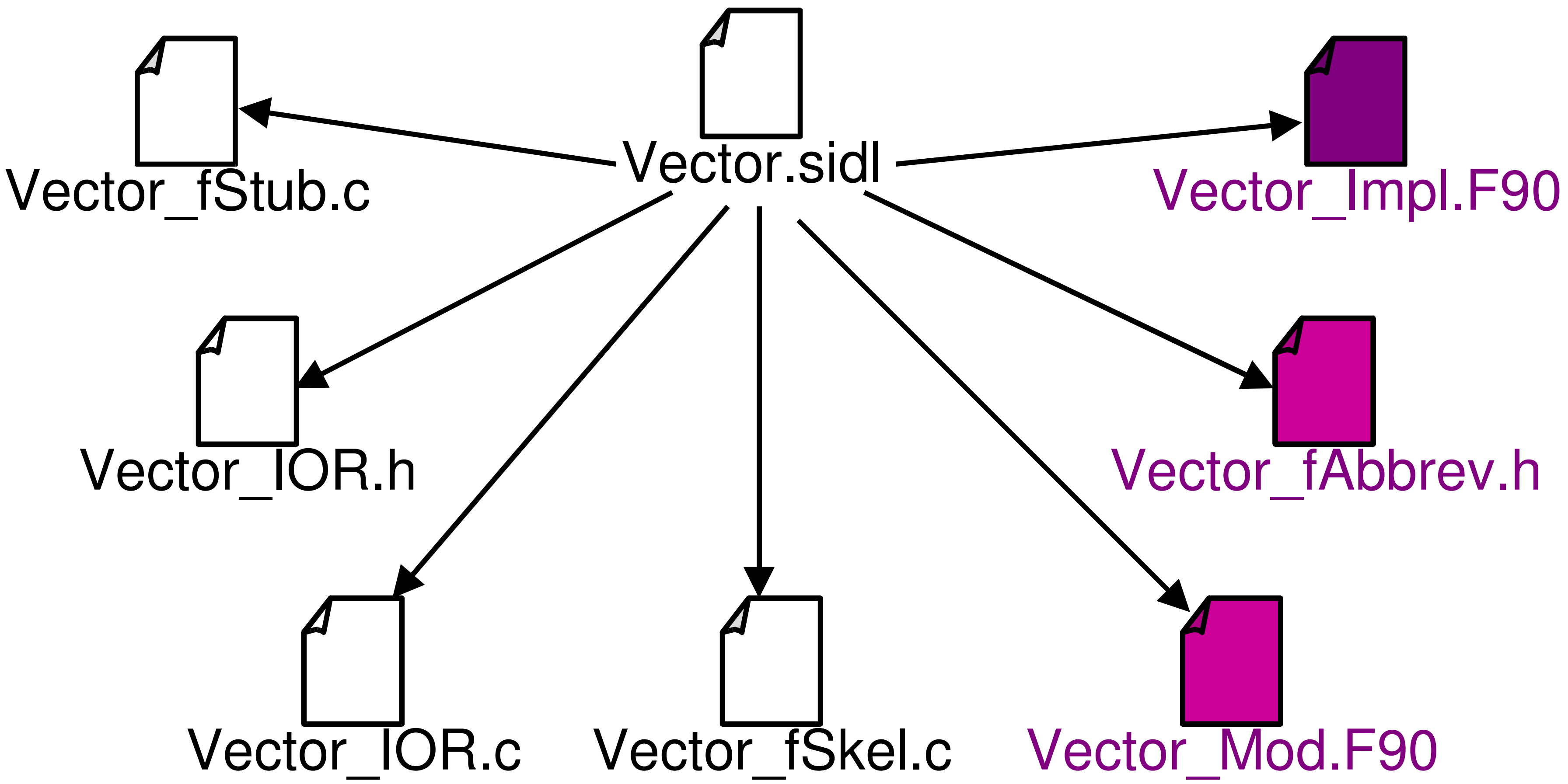
As an example, suppose we have a vector spec that includes a norm interface.



```
interface Vector {
   double norm ();
...
}
```

Vector.sidl

Generated F90 files still similar to their F77 counterparts but now have additional files.



CASC

The resulting Impl file snippet below illustrates the generated code.

```
#include Vector_fAbbrev.h
…
subroutine Vector_norm_mi(self, retval)
  ! DO-NOT-DELETE splicer.begin(Vector.norm.use)
  !    Insert use statements here…
  ! DO-NOT-DELETE splicer.end(Vector.norm.use)
  implicit none
  integer (selected_int_kind(18)) :: self
  real (selected_real_kind(15, 307)) :: retval

! DO-NOT-DELETE splicer.begin(Vector.norm)
!    Insert the implementation here…
! DO-NOT-DELETE splicer.end(Vector.norm)
end subroutine Vector_norm_mi
```

Vector_Impl.F90

The abbreviation header maps human readable method names to mangled ones.

```
#define Vector_somExcessivelyLongMethodName_m

  V_someExcessivejflax_vqhnrqww_m
#define vector_someexcessivelylongmethodname_m

  v_someexcessivejflax_vqhnrqww_m
#define VECTOR_SOMEEXCESSIVELYLONGMETHODNAME_M

  V_SOMEEXCESSIVEJFLAX_VQHNRQWW_M
```

Vector_fAbbrev.h

Finally, there’s a client-side module file snippet for the vector norm.

```
#include “Vector_fAbbrev.h”
…
module Vector
contains
  subroutine norm(self, retval)
  implicit none
  ! in Vector self
  integer (selected_int_kind(18)) :: self
  ! out double retval
  real (selected_real_kind(15, 307)) :: retval

  call Vector_norm_m(self, retval)
end subroutine norm
```

Vector_Mod.F90

Future Work

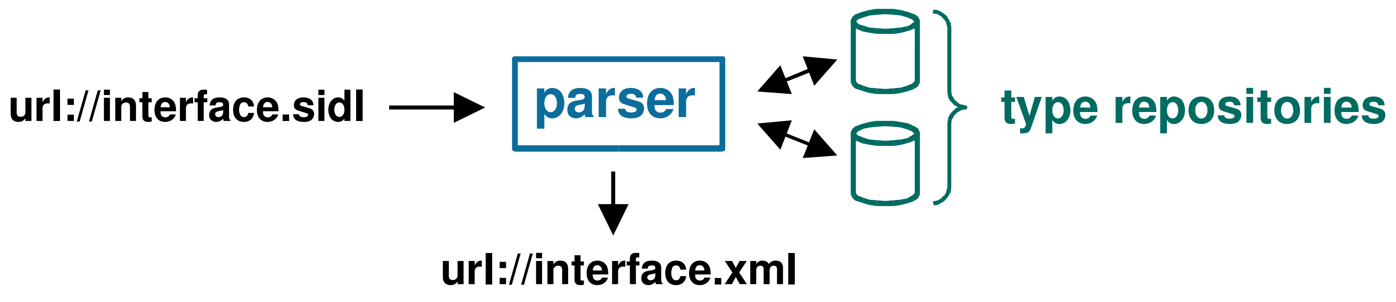
- Near term
  - Complete module files

- Long term
  - Address Fortran 90 array descriptors

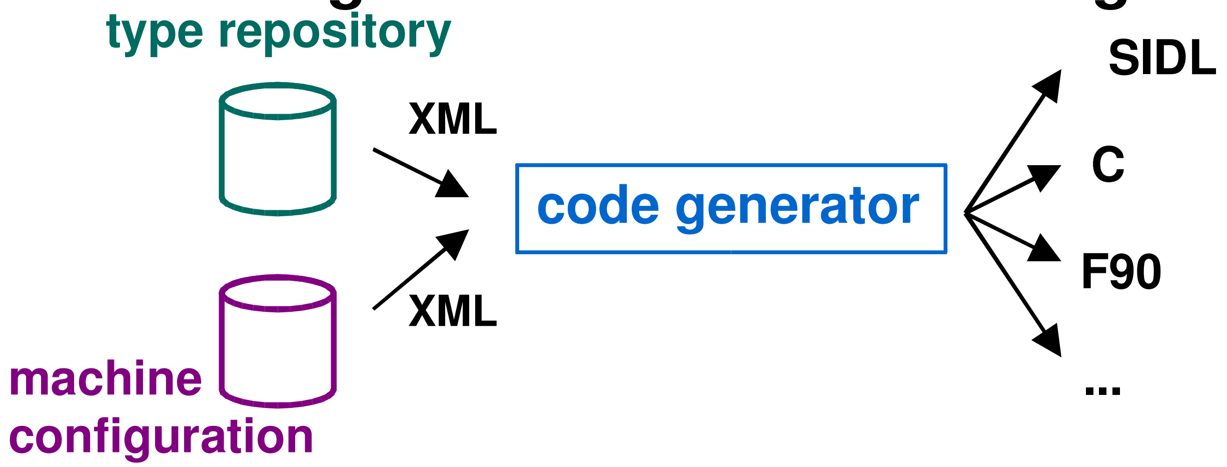
SIDL Backend

Babel can now generate SIDL files from compliant interface specifications.

- Recall Babel can be used to generate XML interfaces



- Now Babel can generate SIDL as well as glue code



Generated files do have some differences when compared to original SIDL files.

- One high-level package per file
  - *Even when* original had multiple such packages

- File name taken from high-level package name

  cca.sidl $\Rightarrow$ gov.sidl
  sidl.sidl $\Rightarrow$ SIDL.sidl

- implements-all becomes implements
  - Inherited methods are included instead

- Comments for enumeration values are lost

- White space differences include indentation, blank spaces and lines, and brace placement.

As an example, suppose we have a specification for package foo.

Original foo.sidl

```
package foo version 1.0 {

  class A { }

  package bar version 2.0 {
    class B { }
  }

}
```

Generated foo.sidl

```
package foo version 1.0 {

  class A {
  }

  package bar version 2.0 {

    class B {
    }

  }


}
```

To also illustrate the new version syntax, suppose we also have package fooTest.

Original fooTest.sidl

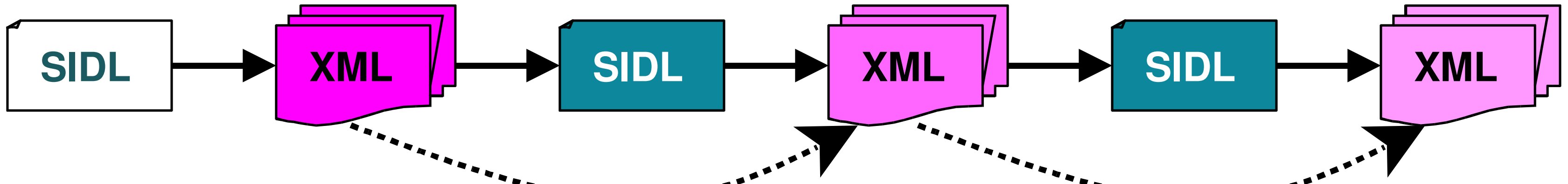
```
// An ignored comment
require foo version 1.0;
require foo.bar version 2.0;

/**
 * Test of comment with < & >.
 */
package fooTest version 0.1 {

  /**
   * An empty class.
   */
  class A extends foo.bar.B { }

  class B extends foo.A {}
}
```

Generated fooTest.sidl

```
require foo version 1.0;
require foo.bar version 2.0;

/**
 * Test of comment with < & >.
 */
package fooTest version 0.1 {

  /**
   * An empty class.
   */
  class A extends foo.bar.B
  {
  }

  class B extends foo.A
  {
  }

}
```

CASC

Tests of generated XML revealed only minor differences even after recursion.



- Metadata differences only
  - date — *unless* --suppress-timestamp used for both XML files
  - source-url
  - source-line — *unless* lines same in SIDL files used to generate the XML files

Continuing with the foo package example, the XML for foo is given below.

```xml
<?xml version=“1.0” encoding=“UTF-8”?>
<!DOCTYPE Symbol PUBLIC “-//CCA//SIDL Symbol DTD v1.1//EN” “SIDL.dtd”>
<Symbol>
  <SymbolName name=“foo” version=“1.0”/>
  <Metadata date=“20030110 10:58:21 PST”>
    <MetadataEntry key=“source-url” value=“file:/home/test/foo.sidl”/>
    <MetadataEntry key=“source-line” value=“1”/>
    <MetadataEntry key=“babel-version” value=“0.8.0”/>
  </Metadata>
  <Comment/>
  <Package final=“false”>
    <PackageSymbol name=“A” type=“class” version=“1.0”/>
    <PackageSymbol name=“bar” type=“package” version=“2.0”/>
  </Package>
</Symbol>
```

foo-v1.0.xml

And for class fooTest.A, which illustrates inheritance and comments.

```
<Symbol>
  <SymbolName name="fooTest.A" version="0.1"/>
  <Metadata date="20030110 10:58:41 PST">
    <MetadataEntry key="source-url" value="file:/home/test/fooTest.sidl"/>
    <MetadataEntry key="source-line" value="12"/>
    <MetadataEntry key="babel-version" value="0.8.0"/>
  </Metadata>
  <Comment>
An empty class.
  </Comment>
  <Class abstract="false">
    <Extends>
      <SymbolName name="foo.bar.B" version="2.0"/>
    </Extends>
    <ImplementsBlock/>
    <AllParentClasses>
      <SymbolName name="foo.bar.B" version="2.0"/>
      <SymbolName name="SIDL.BaseClass" version="0.8.0"/>
    </AllParentClasses>
    <AllParentInterfaces>
      <SymbolName name="SIDL.BaseInterface" version="0.8.0"/>
    </AllParentInterfaces>
  </Class>
</Symbol>
```

fooTest.A-v0.1.xml

The *--text* option has been added to enable generation of SIDL text.

Usage babel [-h | --help] or babel [-v | --version]
or babel *option(s) sidlfilename1* ... *sidlfilenameN*
where help, version, and option(s) are

-h	| --help	Display usage information and exit.
-v	| --version	Display version and exit.
-p	| --parse-check	Parse the sidl file but do not generate code.
-x	| --xml	Generate only SIDL XML (deprecated; use -tXML).
-c*lang*	| --client=*lang*	Generate only client code in specified language (C | C++ | F77 | F90 | Java | Python).
-s*lang*	| --server=*lang*	Generate server (and client) code in specified language (C | C++ | F77 | F90 | Python).
-t*form*	| --text=*form*	Generate only text in specified form (XML | SIDL), where XML updates the repository.
-o*dir*	| --output-directory=*dir*	Set Babel output directory ('.' default).
-R*path*	| --repository-path=*path*	Set semicolon-separated URL list used to resolve symbols.
-g	| --generate-subdirs	Generate code in subdirs matching package hierarchy.
--no-default-repository		Prohibit use of default to resolve symbols.
--suppress-timestamp		Suppress timestamps in generated files.
--generate-sidl-stdlib		Regenerate only the SIDL standard library.

Future Work

- Near term
  - Add new automated regression tests
  - Fill in new chapter in User’s Guide
- Long term
  - ***TBD***

Reentrant & unversioned packages

- Packages are now reentrant by default
- Packages can be declared as “final” to make them nonreentant
- Packages that only contain other packages can be unversioned

New version syntax

- In response to feedback from tutorial
- require x.y.z version 1.0;
- import x.y.z version 1.0;
  import x.y.z;
- package x version 1.0 {

  }

Usability improvements

- --vpath to indicate the source directory for the impl files
  - Separates hand written files from generated ones
- #line directives for easier debugging of C & C++ impl files

IOR & SIDL.BaseClass additions

- **SIDL.BaseClass stores IOR version for the class in its private data**
- **IOR now has function to retrieve IOR version**
- **SIDL.BaseClass has new getClassInfo() that returns**
- **SIDL.ClassInfo**

```
interface ClassInfo {
    /**
     * Return the name of the class.
     */
    string getName();

   /**
    * Get the version of the intermediate object representation.
    * This will be in the form of major_version.minor_version.
    */
    string getIORVersion();
 }
```

Infrastructure changes

- SIDL runtime library is separable
  - Separate configuration, compilation & distribution
- Babel testing using Gauntlet instead of Petf