

Understanding GCC: The Essential Abstractions in GCC

GCC Resource Center

(www.cse.iitb.ac.in/grc)

Department of Computer Science and Engineering,
Indian Institute of Technology, Bombay



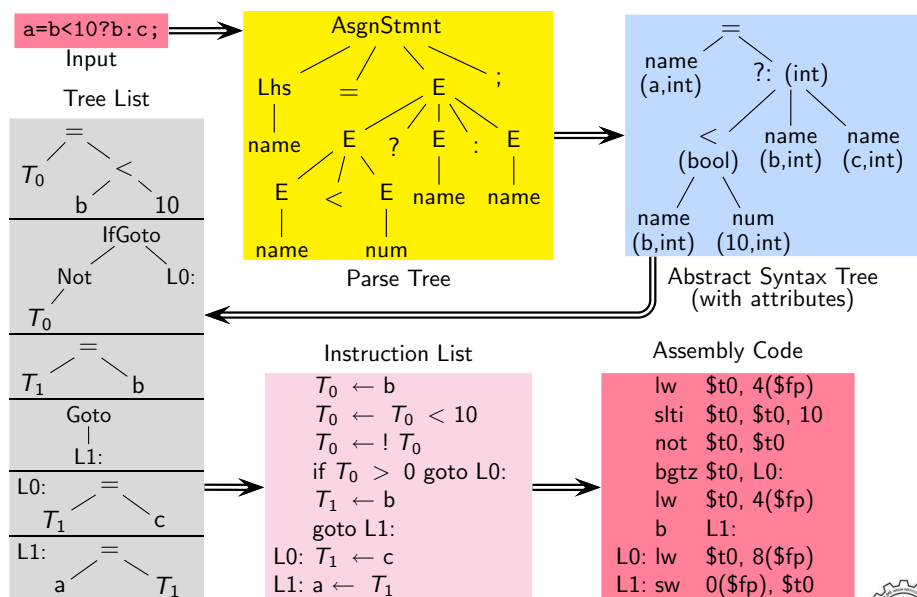
July 2010

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Summary:

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Translation Sequence in Our Toy Compiler



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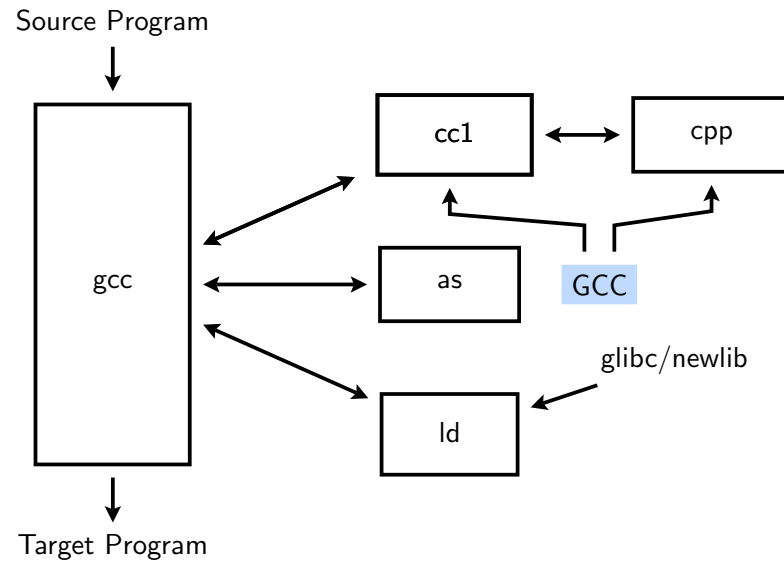
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Translation Sequence in Our Toy Compiler

Notes



The GNU Tool Chain

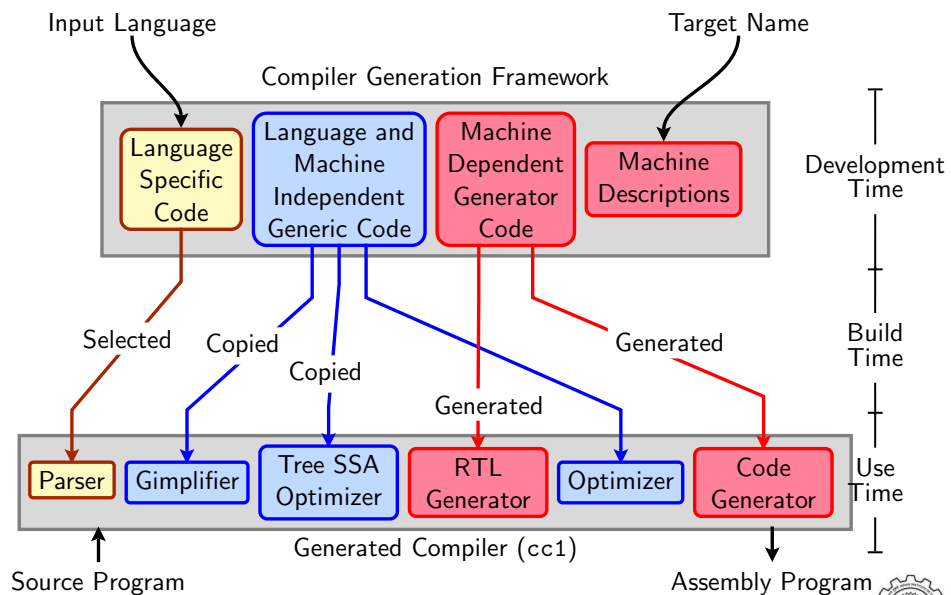


The GNU Tool Chain

Notes



The Architecture of GCC

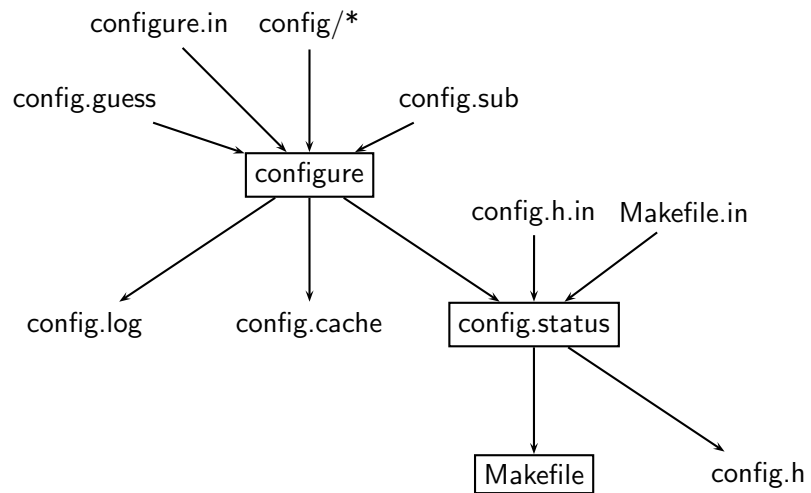


The Architecture of GCC

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Configuring GCC

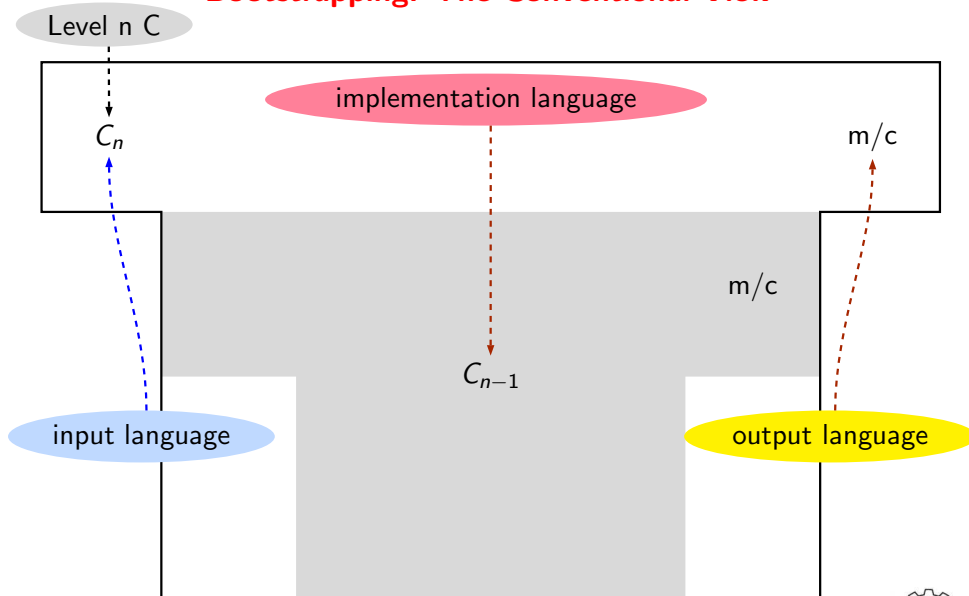


Configuring GCC

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Bootstrapping: The Conventional View

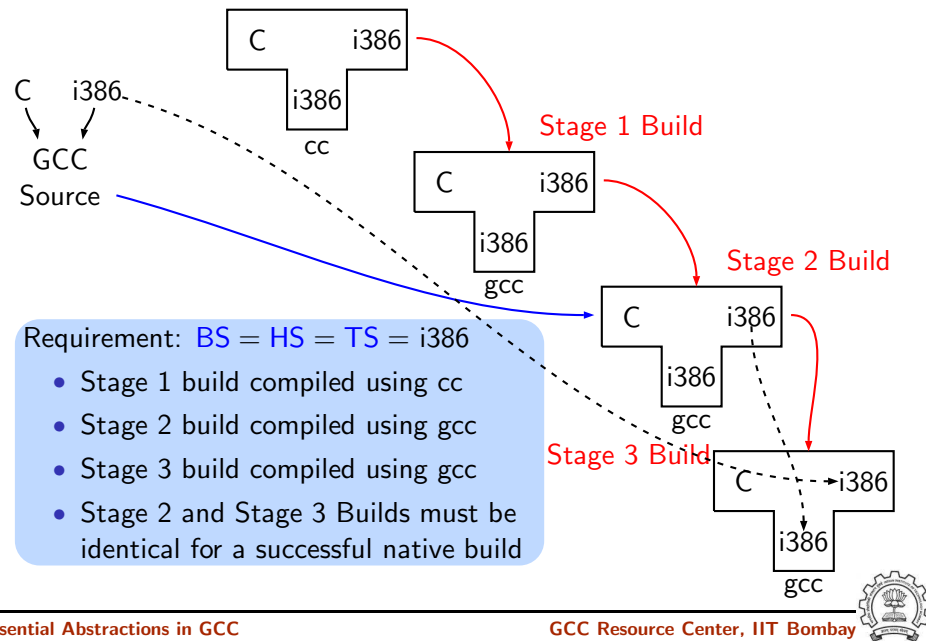


Bootstrapping: The Conventional View

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A Native Build on i386



A Native Build on i386

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Build for a Given Machine

This is what actually happens!

- Generation
 - ▶ Generator sources $(\$(SOURCE_D)/gcc/gen*.c)$ are read and generator executables are created in $\$(BUILD)/gcc/build$
 - ▶ MD files are read by the generator executables and back end source code is generated in $\$(BUILD)/gcc$
- Compilation

Other source files are read from $\$(SOURCE_D)$ and executables created in corresponding subdirectories of $\$(BUILD)$
- Installation

Created executables and libraries are copied in $\$(INSTALL)$

genattr
gencheck
genconditions
genconstants
genflags
genopinit
genpreds
genattrtab
genchecksum
gencondmd
genemit
gengenrtl
genmddeps
genoutput
genrecog
genautomata
gencodes
genconfig
genextract
gengtype
genmodes
genpeep

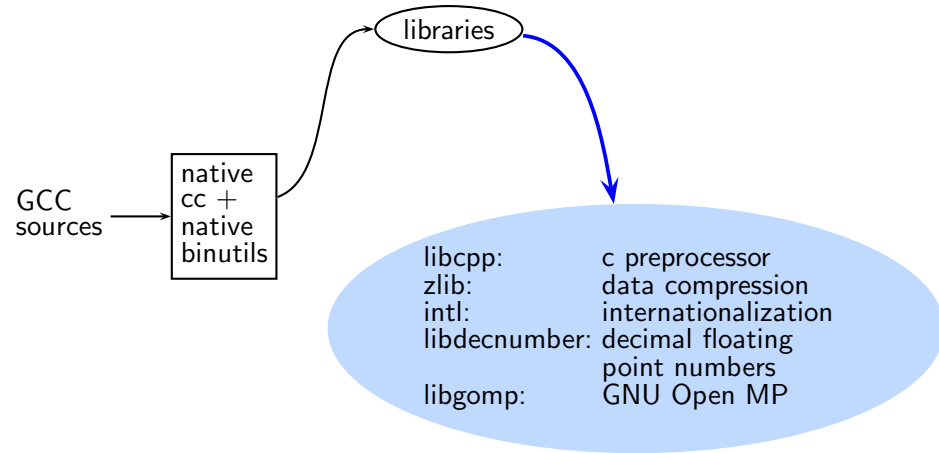


Build for a Given Machine

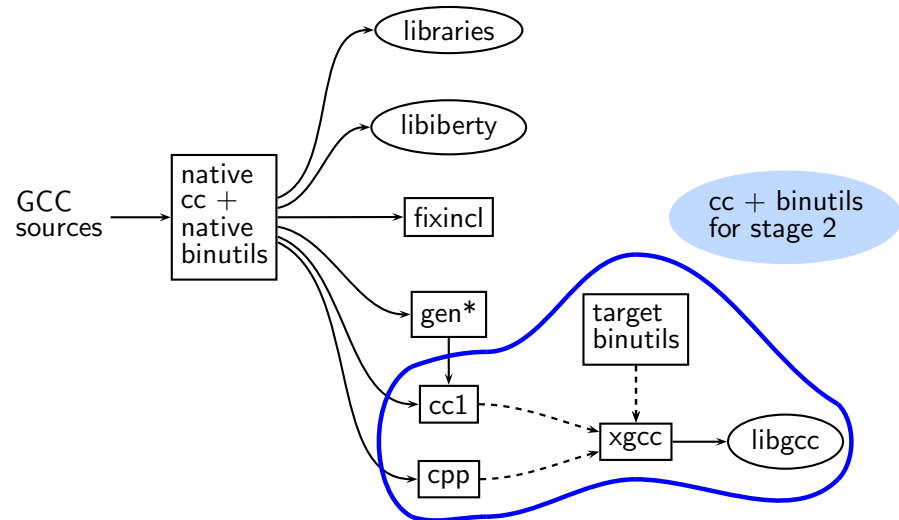
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More Details of an Actual Stage 1 Build for C



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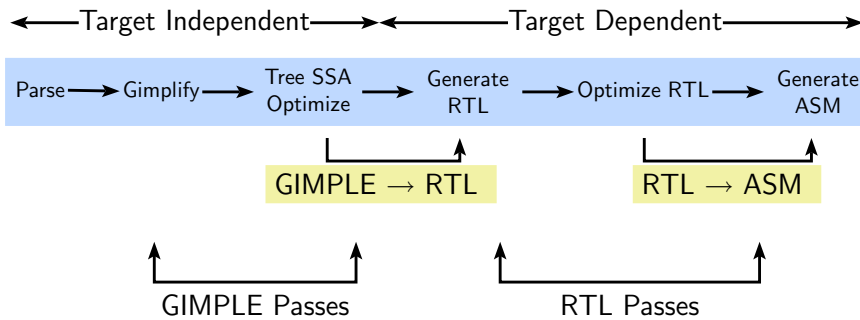
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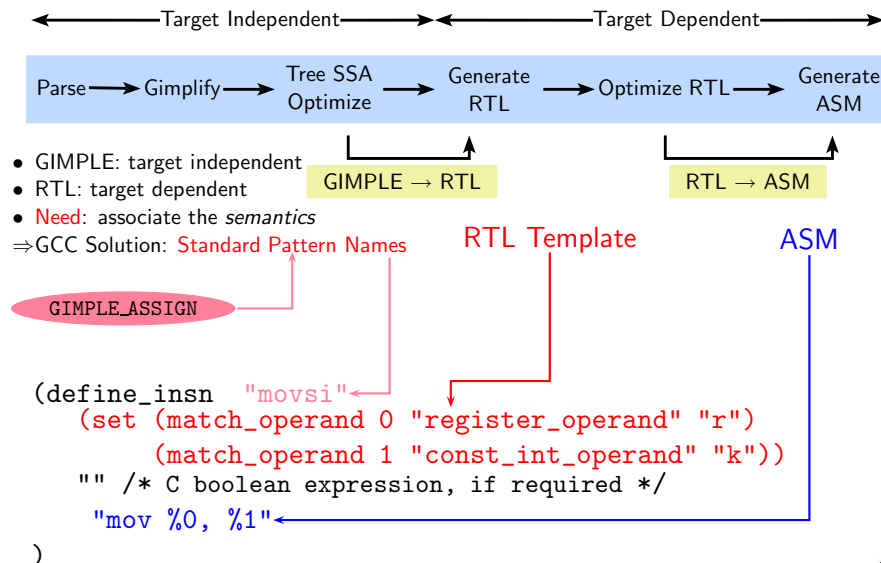


Basic Transformations in GCC

Transformation from a language to a *different* language



Instruction Specification and Translation: A Recap



Basic Transformations in GCC

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Instruction Specification and Translation: A Recap

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Translation Sequence in GCC

```
(define_insn
  "movsi"
  (set
    (match_operand 0 "register_operand" "r")
    (match_operand 1 "const_int_operand" "k")
  )
  "" /* C boolean expression, if required */
  "li %0, %1"
)
```

Development

D.1283 = 10; ⇒

```
(set
  (reg:SI 58 [D.1283])
  (const_int 10: [0xa])
)
```

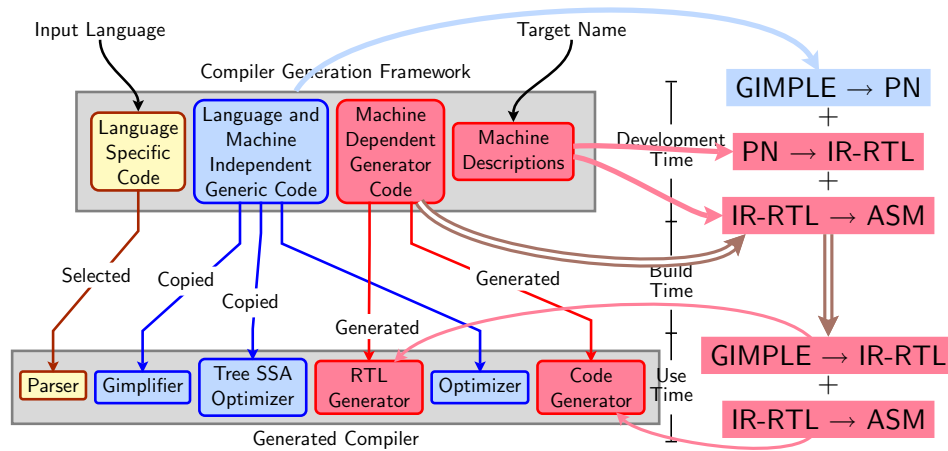
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Essential Abstractions in GCC

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Retargetability Mechanism of GCC



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Translation Sequence in GCC

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Retargetability Mechanism of GCC

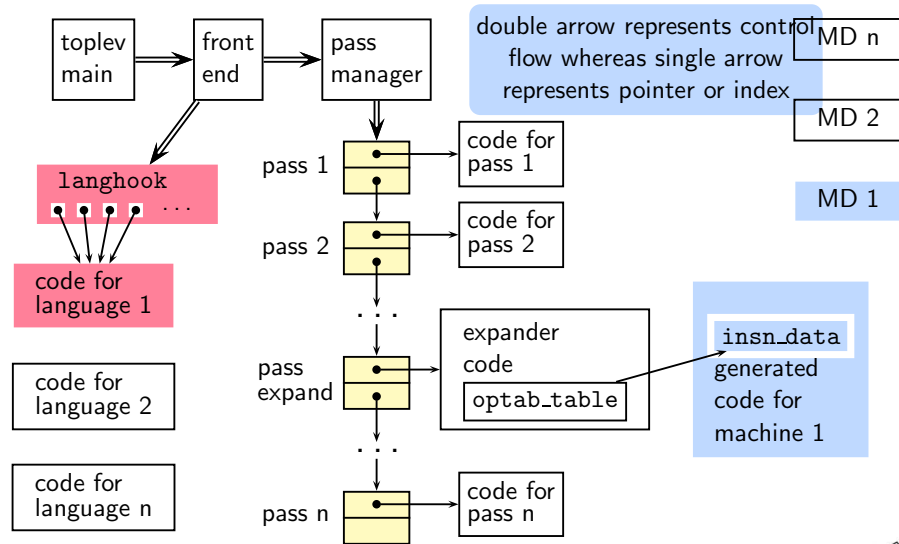
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Plugin Structure in cc1

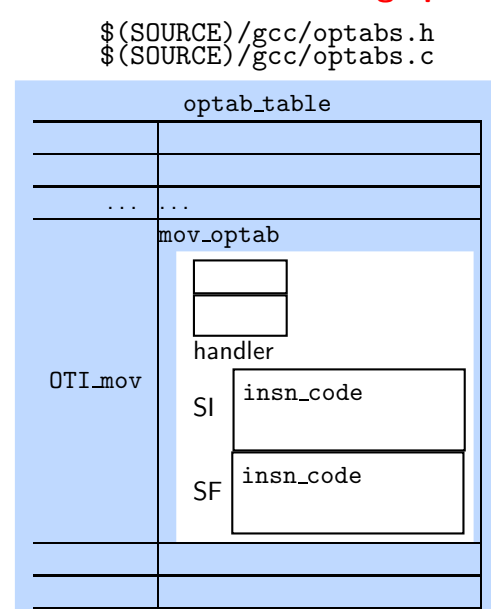


Plugin Structure in cc1

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Hooking up Back End Details

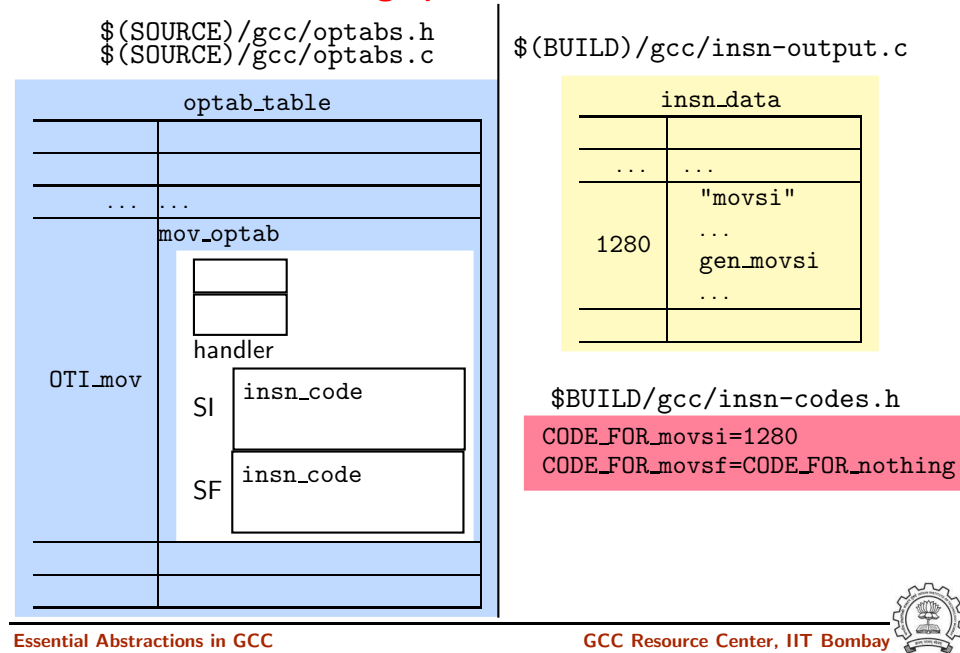


Hooking up Back End Details

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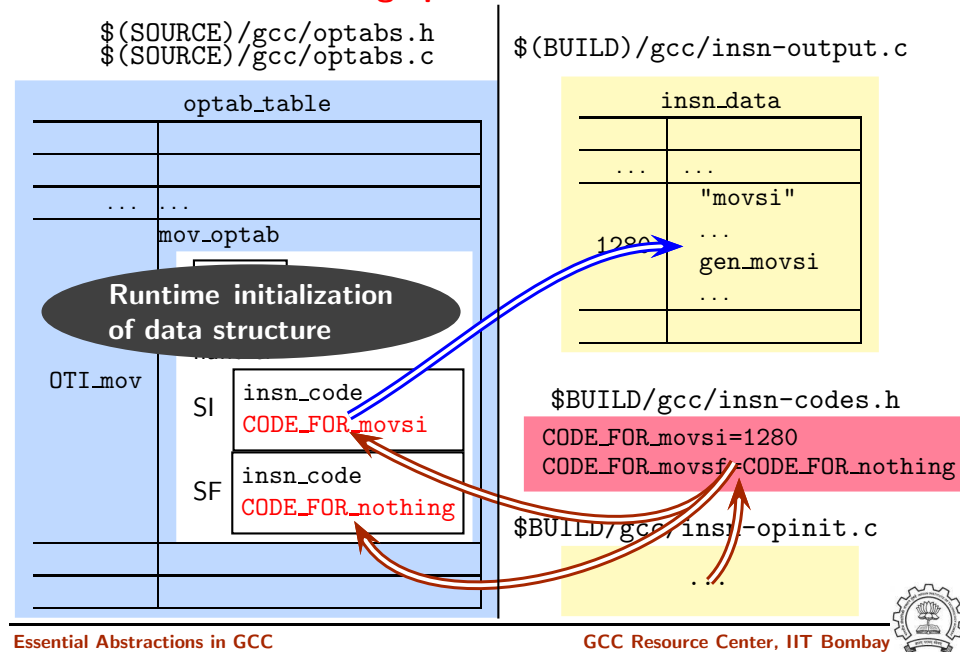
Hooking up Back End Details



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