CS 101 Computer Programming and Utilization

Lecture 9

Separate compilation of functions
Decision Trees

Feb 8, 2011

Prof. R K Joshi
Computer Science and Engineering
IIT Bombay
Email: rkj@cse.iitb.ac.in

Revision: Functions

- Giving names to code segments
- A unit of reuse, define once, ensure correctness, use again and again
- Functions and procedures
- Functions like mathematical functions
  - Inputs
  - An output
  - No history remembered
- Function declaration
  - Also called 'signature'
  - Name, input types, output type
- Function definition: body
- Function invocation (call)
  - Send in the actual parameters
  - Obtain a return value
  - Control transfers to the function
- Caller blocks till a function call completes
- When a call returns, the control is transferred back to caller

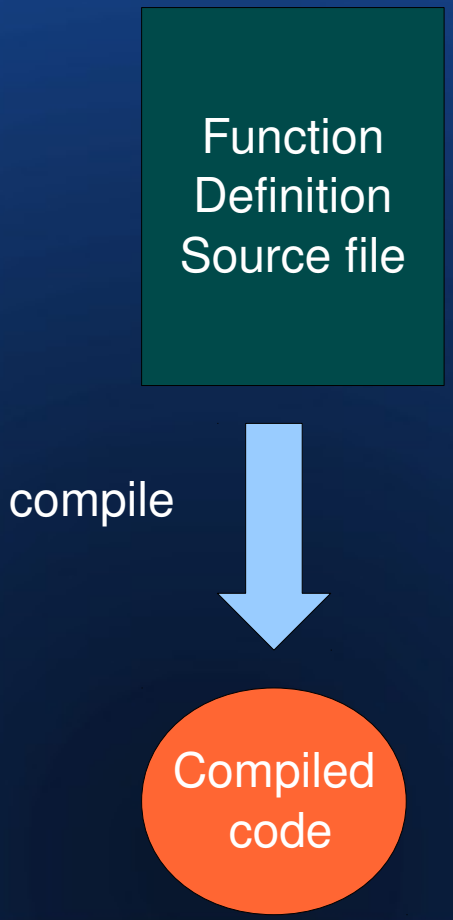
Separate Compilation

- What if you wanted to use a function defined in your program in some other program?
- You will have to copy the code in the program and then use the function call
- This can be avoided by writing the function in a separate file
- The file can be linked with your program

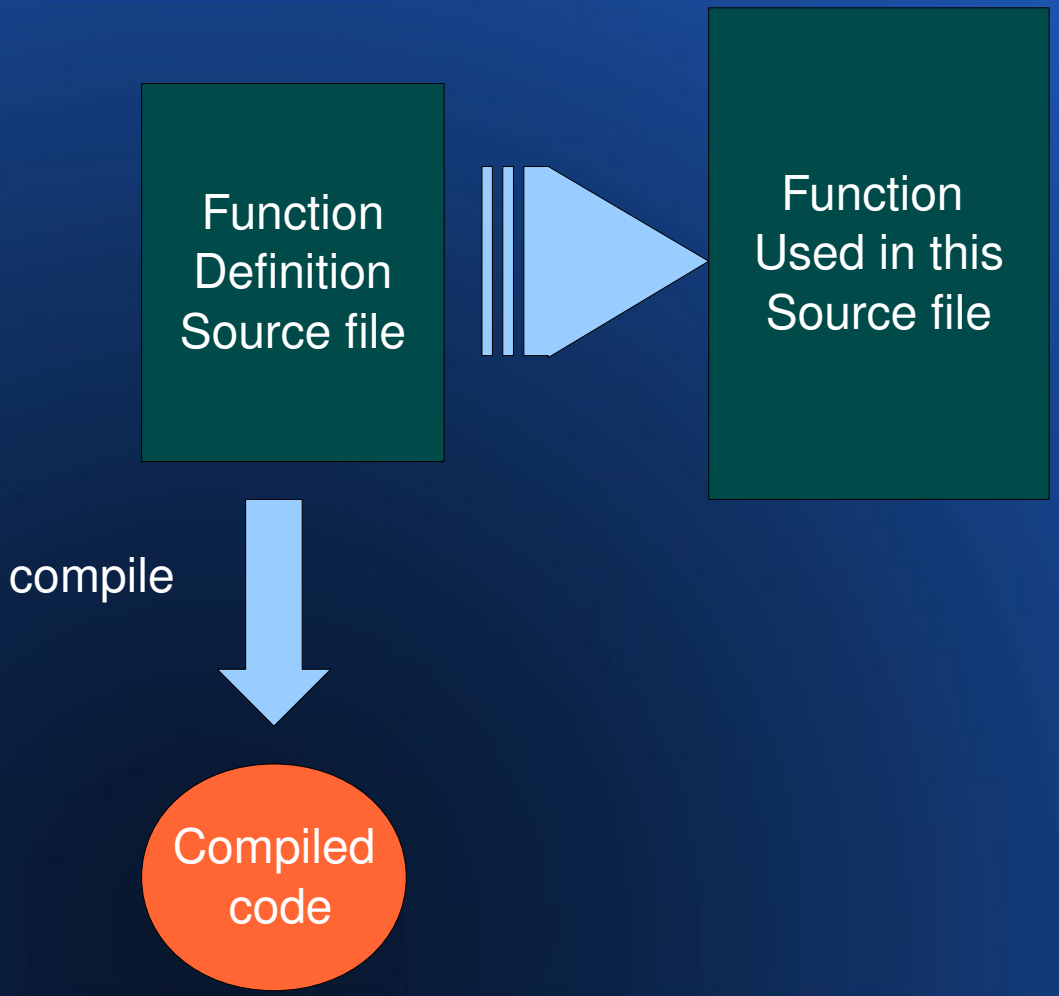
Separating function definition from its use, and compiling them separately

Function Definition Source file

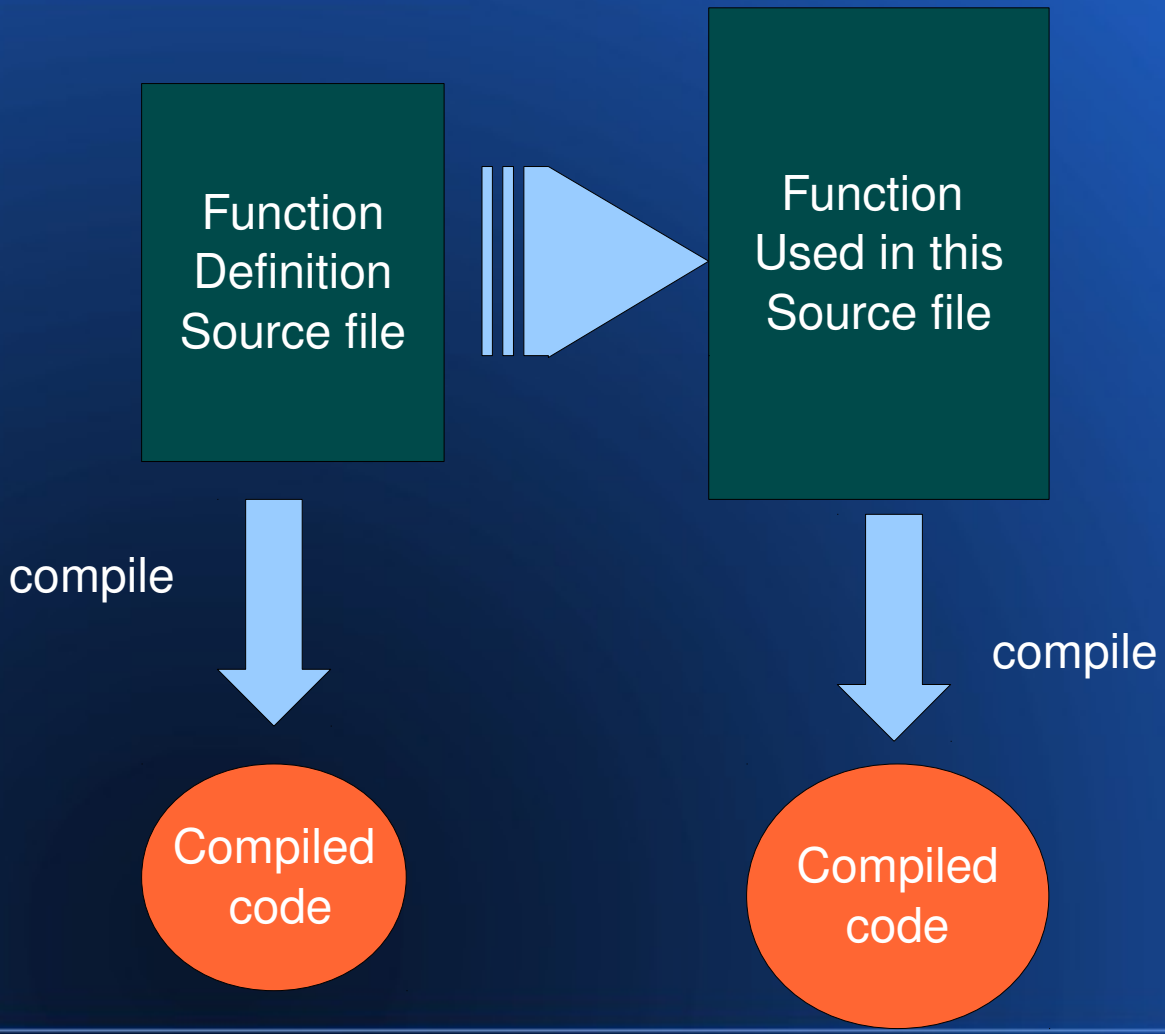
Separating function definition from its use, and compiling them separately



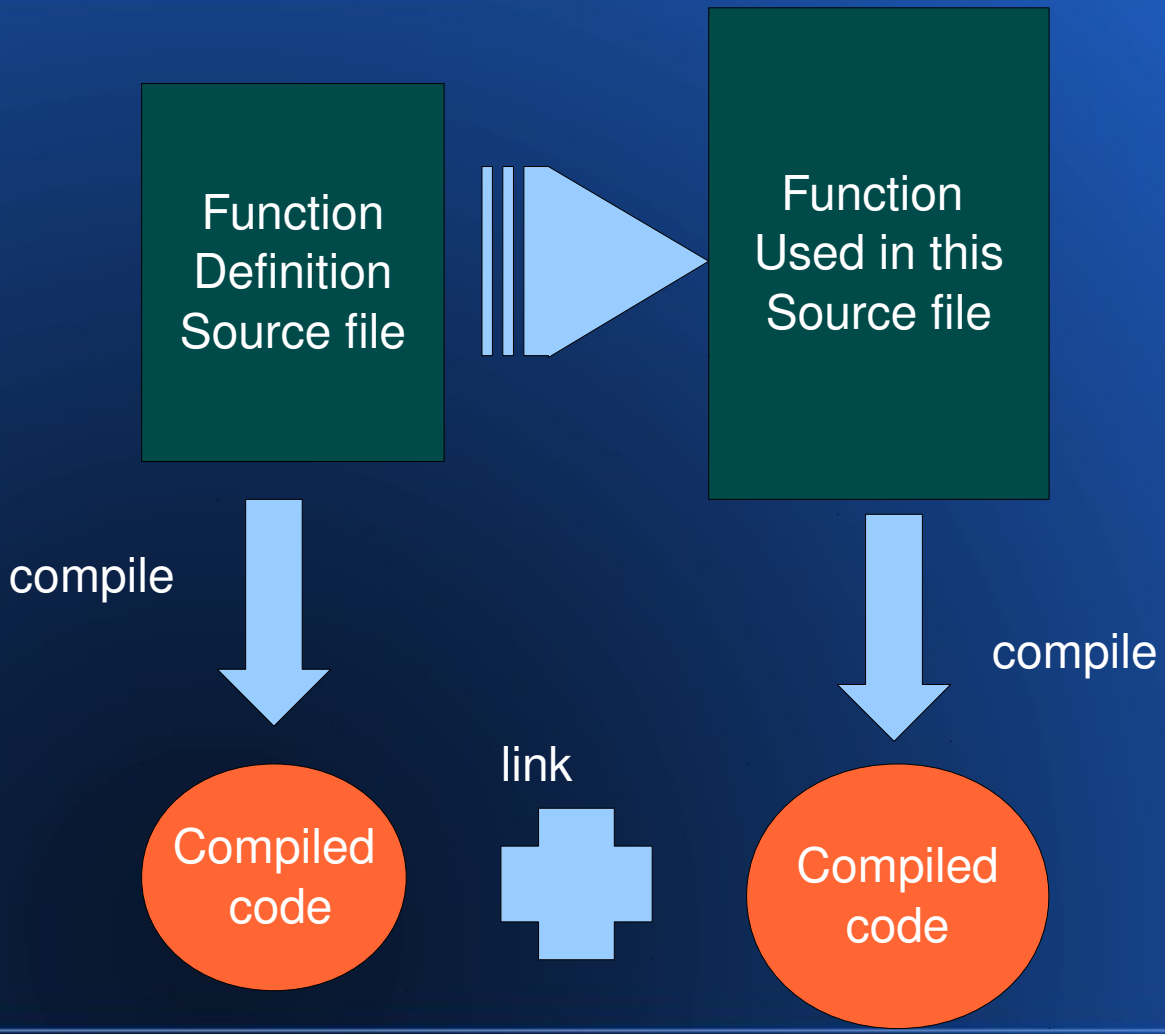
Separating function definition from its use, and compiling them separately



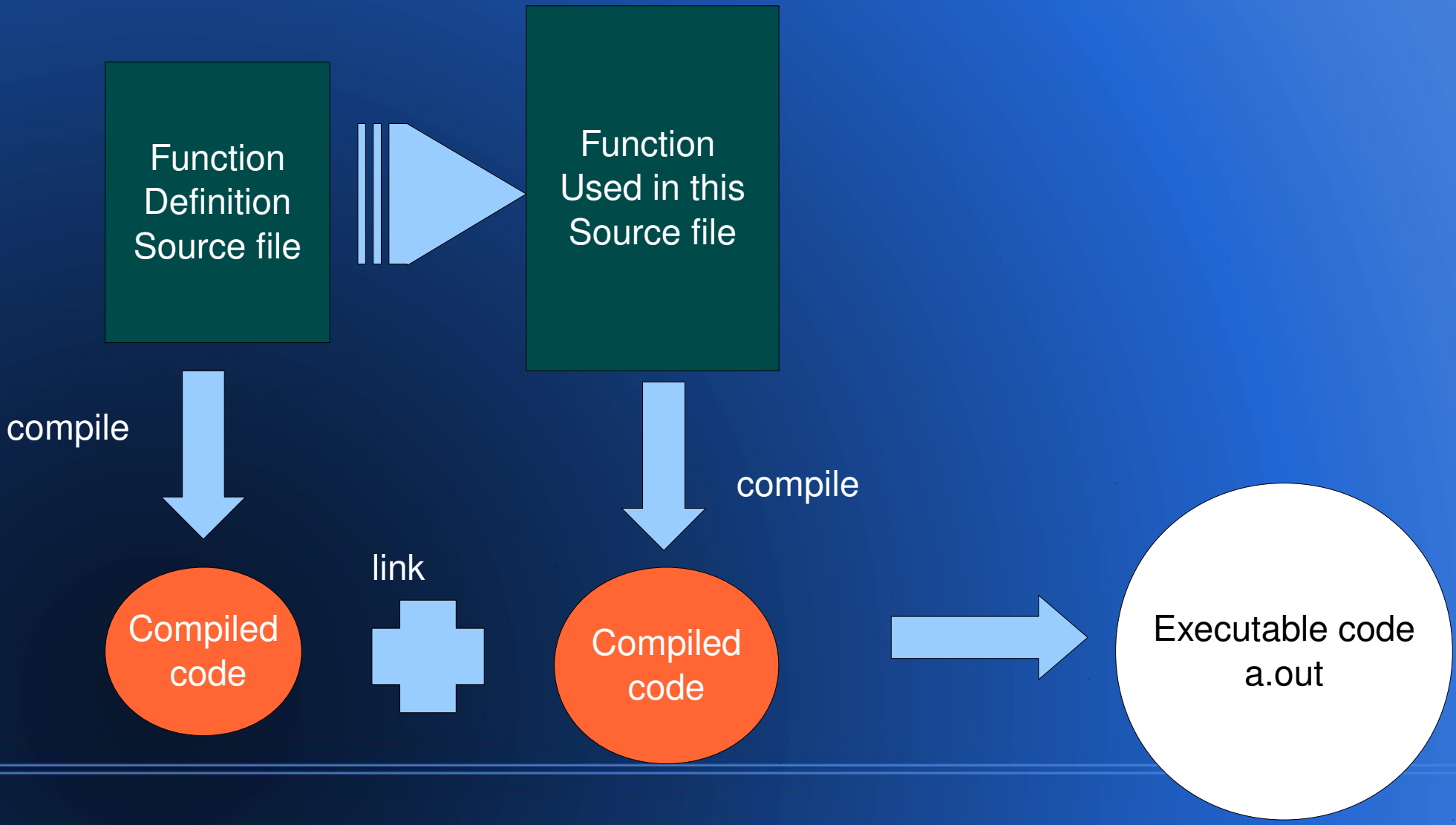
Separating function definition from its use, and compiling them separately



Separating function definition from its use, and compiling them separately



Separating function definition from its use, and compiling them separately



Decision Trees

First ← second ← first number

Whenever a next number 'n' comes up..

What would you do?

Decision Tree

first==second?

Decision Tree

first==second?

Yes

Decision Tree

first==second?

Yes

n is

higher

Decision Tree

first==second?

Yes

n is higher

n is lower

Decision Tree

first==second?

Yes

n is higher	n is lower	n is same as both

Decision Tree

first==second?

Yes

n is higher	n is lower	n is same as both
first ← n		

Decision Tree

first==second?

Yes

n is	n is	n is same
higher	lower	as both
first ← n	second ← n	

Decision Tree

first==second?

Yes

n is higher	n is lower	n is same as both
first ← n	second ← n	don't bother

Decision Tree

first==second?

Yes

No

Decision Tree

first==second?

Yes

No

n in

between

Decision Tree

first==second?

Yes

No

n in between

n higher than first

Decision Tree

first==second?

Yes

No

n in between

n higher than first

n smaller than second

Decision Tree

first==second?

Yes

No

n in between

Second ← n

n higher than first

n smaller than second

Decision Tree

first==second?

Yes

No

n in between	n higher than first	n smaller than second
Second ← n	second ← first First ← n	

Decision Tree

first==second?

Yes

No

n in between	n higher than first	n smaller than second
Second ← n	second ← first First ← n	don't bother

Decision Tree

first==second?

Yes

No

n in between	n higher than first	n smaller than second
Second ← n	second ← first First ← n	don't bother

Any case left out?

Decision Tree

first==second?

No

n in between	n higher than first	n smaller than second	n same as first	n same as second
Second ← n	second ← first First ← n	don't bother	don't bother	don't bother

Another tree

n > first

Yes

No

Another tree..

n > first

Yes

No

n=first

first < n > second

n = second

n < second

Complete this...

Yet another tree

N < second?

Yes

no

How will you grow this one?