Function argument passing

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Overview

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  - Argument types are checked during compilation and implicit type conversions take place when necessary

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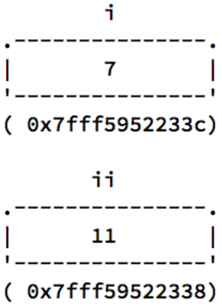

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- Passing an argument by value works the exact same way as initializing a variable with some value
    - Changes that the function makes to the parameter will *never* be reflected in the object (i.e., argument) used to initialize that parameter: we're merely working with a copy of the argument

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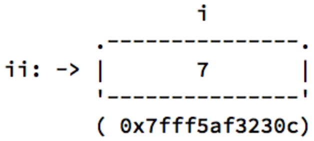

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- Passing an argument by reference works the exact same way as binding a reference to a named object for which it is initialized
    - Changes that the function “makes” on a reference parameter will *always* be reflected in the object bound to that reference
    - The reference parameter is simply another name for the object for which it is initialized

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  - Passing such objects by reference allows our functions to operate on objects that cannot be copied

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- Sometimes, we would like to “return” multiple objects to the caller
  - We could create a user-defined type that contains those objects
  - An easier solution is to pass-by-reference additional arguments that can be used to house the values that we'd like to return

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const int &i = j;
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  - What happens if we write the statement `*pr = 11;` in our program?

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- Use pass-by-value for small objects, such as the primitive built-in types
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    - Such indirection would require us to look-up the address of the object being referenced and then look up the object residing at that address
- Use pass-by-const-reference for large objects, such as vectors
- Use pass-by-reference *only when you have to*
  - Favor returning a result rather than modifying an object through a reference argument

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Functions that return a value

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- The value that the function returns must match the return type or be compatible with the return type

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  - The type of this variable is that of the return type
- This temporary is the result of the function call
- The semantics used for initializing the temporary are identical to the semantics of initialization

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Never return a reference or pointer to a local variable

- Why not?
- Think about this... with respect to an automatic variable's lifetime...

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References

- Lippman, B., Lajoie, Josee, & Moo, B. E. (2016). *C++ primer* (5th ed.). Addison-Wesley.
- Stroustrup, B. (2014). *Programming: principles and practice using C++* (2nd ed.). Addison-Wesley.