

CS11600: Introduction to Computer Programming (C++)

Lecture 15

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Outline

- Abstract base classes
- Run-time type identification (RTTI)
- Applications of RTTI
- Dynamic casting

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Abstract Base Class

- An abstract base class is never instantiated
 - often sits at the top of object hierarchy.
- Pure virtual functions
`virtual void fun() = 0;`
 - No implementation, derived classes must override it.

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Run-Time Type Identification

- RTTI: figure out the type of an object at run-time.
- Why? Polymorphism solves the problem?
 - Not always.
- Several derived classes from the same base have different member functions.

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Application of RTTI

- When polymorphism is not appropriate:
 - Extending class libraries without modifying them.
 - Derived classes have member functions not appropriate for other derived classes.

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Dynamic Casting

- Language support for RTTI.
 - `dynamic_cast`
 - Works with pointers and references of **polymorphic** classes.
 - Return 0 if unsuccessful for pointers; raises exception for references.
- ```
dynamic_cast<Room *>(loc)
```

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## Typeid Operator

- Determines the type of an object.
  - Dynamically for expressions of polymorphic types
  - Statically otherwise.
  - A pointer, which points to an object of polymorphic type, **is not** polymorphic!
- Typeid is overloaded for:
  - Type, e.g. `typeid(int)`
  - Expression, e.g. `typeid(loc)`