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.

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.

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.

Dynamic Casting

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