CSE-4301
Object Oriented Programming
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Week-11

Exception

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Definition

- Exceptions are errors that occur at runtime
- For various reasons:
  - running out of memory,
  - not being able to open a file,
  - trying to initialize an object to an impossible value
  - using an out-of-bounds index to a vector.

Necessity of Exception

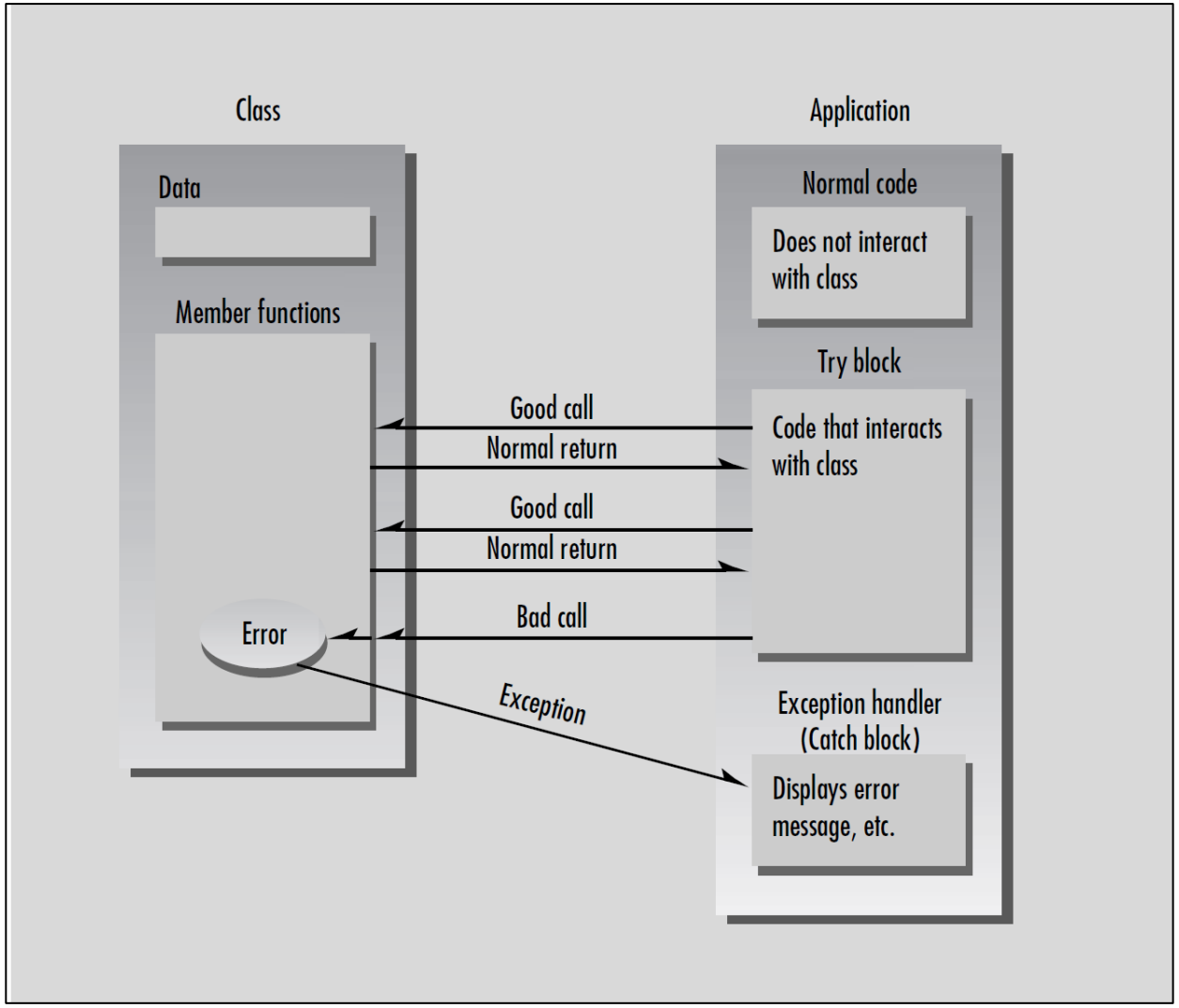
- Check each time when the function is called.
- Requires lots of code and make code hard to read
- In a class definition errors may take place without a function being explicitly called.
  - Constructor is called implicitly so if else check is not possible

```
if( somefunc() == ERROR_RETURN_VALUE )
   //handle the error or call error-handler function
else
   //proceed normally
if( anotherfunc() == NULL )
   //handle the error or call error-handler function
else
   //proceed normally
if( thirdfunc() == 0 )
   //handle the error or call error-handler function
else
   //proceed normally
```

Exception Syntax

- application makes a mistake -> causing an error to be detected in a member function.
- This member function then informs the application that an error has occurred. When exceptions are used, this is called ***throwing*** an exception.
- In the application we install a separate section of code to handle the error. This code is called an ***exception handler*** or ***catch block***; it *catches* the exceptions thrown by the member function.
- Any code in the application that uses objects of the class is enclosed in a ***try*** *block*. Errors generated in the **try** block will be caught in the **catch** block.

Exception Mechanism



The exception mechanism uses three new C++ keywords:

- throw,
- catch, and
- try.

Also, a kind of entity called an exception class needs to be created

See the demo code for skeleton program that handles exception

Important items

- exception class
- throw an error
- throw transfers program control to exception handler.
- try block
- catch block ->exception handler.

Bad_alloc class

- thrown if an error occurs when attempting to allocate memory with new

Exception Notes

- Function Nesting
  - install a try block on the program's upper level. Lower-level functions need not be so encumbered, provided they are called directly or indirectly by functions in the try block.

- Exceptions and Class Libraries
  - While writing a class library, you should cause it to throw exceptions for anything that could cause problems to the program using it

Exception Notes

- Not for Every Situation
  - impose a certain overhead in terms of program size and (when an exception occurs) time.
- Destructors Called Automatically
  - When an exception is thrown, a destructor is called automatically for any object that was created by the code up to that point in the try block.
- Handling Exceptions
  - After you catch an exception, you will sometimes want to terminate your application. The exception mechanism gives you a chance to indicate the source of the error to the user, and to perform any necessary clean-up chores before terminating.