

## Plan for Today

### AST, CallGraph, and dynamic function stack

- example
- when do we know what?

### Control Flow

- due to if statements and while loops
- due to returns and exceptions

### Exceptions in Java

- try and catch blocks
- finally blocks

### Exceptions in MiniJava compiler

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Exception Handling

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## Example Program

```
public static void main(String args[]) {
    foo();
    int reeval;
    reeval = goo();
    if (reeval==ERROR)
        System.out.println("goo ERROR in main");
}

void foo() {
    int reeval;
    reeval = goo();
    if (reeval==ERROR)
        System.out.println("goo ERROR in foo");
}

int goo() {
    if (random()>42) return ERROR;
    return 0;
}
```

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## Example Program with Exceptions

```
public static void main(String args[]) {
    try {
        foo();
        goo();
    } catch (Exception e) {
        System.out.println("Caught in main");
    }
}

void foo() {
    try {
        goo();
    } catch (Exception e) {
        System.out.println("Caught in foo");
    }
}

void goo() throws SomeException {
    if (random()>42) throw new SomeException();
}
```

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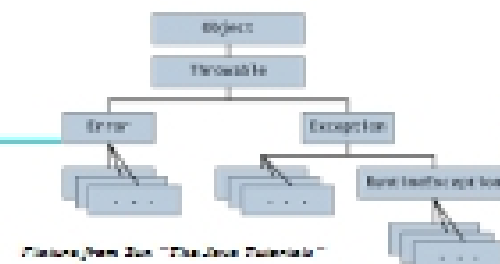
## Exceptions in Java

```
public static void main(String args[]) {
    PrintWriter out = null;

    try {
        out = new PrintWriter(new FileWriter("b.txt"));
    } catch (IOException e) {
        System.err.println("Caught IOException: " + e.getMessage());
    }

    finally {
        if (out != null) {
            System.out.println("Closing PrintWriter");
            out.close();
        }
    }

    throw new MyException();
}
```



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## Exception usage in the MiniJava compiler

### try block

- is it necessary?
- applying the `CheckTypes` switch/visitor to the AST could result in a `SemanticException` being thrown

```
try {
  // Create a Lexer instance.
  Lexer lexer = new Lexer(new PushbackReader(
    new BufferedReader(new FileReader(filename)), 1024));

  // type checking
  cat.apply(new CheckTypes(globAST, linesToNodes));

} catch (exceptions.SemanticException e) {
  System.err.println(e.getMessage());
  System.exit(1);
} catch (Exception e) {
  e.printStackTrace();
  System.exit(1);
}
```

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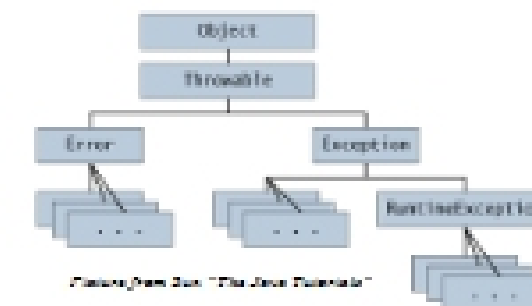
Exception Handling

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## But why isn't `SemanticException` a checked exception?

### Java rules (paraphrased)

- any exception that is not an `Error` or `RuntimeException` subclass must be caught
- if a method that doesn't catch a checked exception it throws then it must indicate with a "throws" clause that it could throw that exception



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