**Using Types and Inheritance in Object Oriented Programming**

**Concepts**
- Objects have state and behavior
- Send messages to each other
- Types of objects can have a hierarchy

**Types**
- Have instances (objects)
- Bank Account
  - Current Balance
  - Account Number
- Operations
  - Withdraw
  - Deposit
- Fields (state)
OO Programming

- Concentrates on the data
- Types are a natural basis for modularization

Sub typing and Inheritance

- One type can be subtype of another
- A subtype can have multiple parents
- Inheritance

Partial types

- Partial or No Implementation
- Abstract types:
  - Dictionary class in Java
Protocols

- A type obeys certain protocol
- The set of operations in a type defines a protocol
- Partial types can be used for this

Creating types

Decomposition

- Identify the major types of objects required
- Develop an interface
- Develop an implementation
Process versus Data

Employee
  ...
  Payroll()
  ...

Payroll
  ...

Where to put functionality

- Difficult to choose which types to use

Student
  ...
  enroll()
  ...

Course
  ...
  enroll()
  ...

String
  ...
  lexicalParse()
  ...

Lexical Parser
  ...


Where to put functionality

- Reusability
- Complexity
- Applicability
- Implementation knowledge

Example: Sorting

- Complexity

Example: Sorting

- Applicability