BLG252E-OBJECT ORIENTED PROGRAMMING

15.04.2013

Practice Session 2

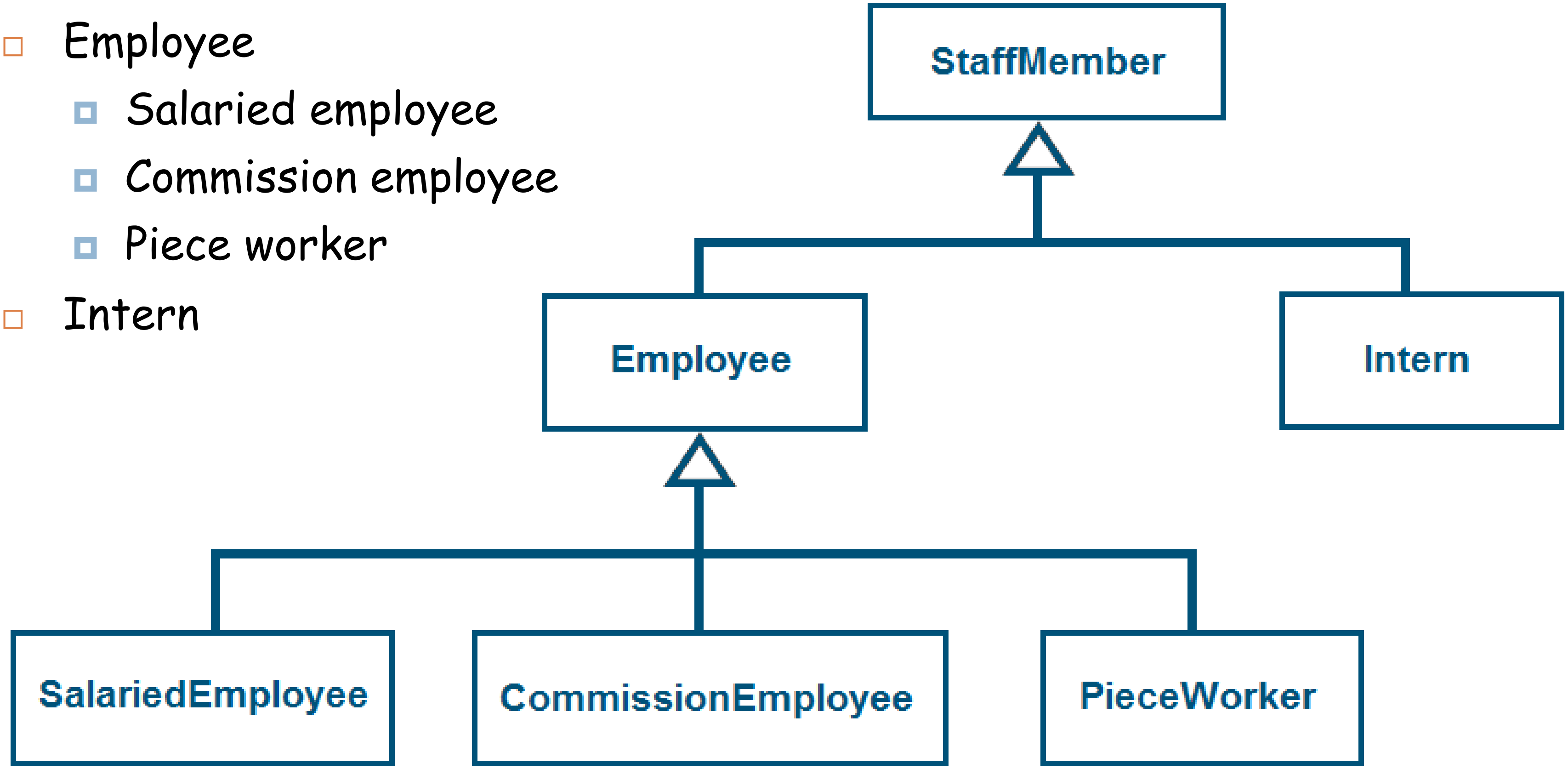
What will we cover?

- Inheritance
- Polymorphism

What will we do?

Consider a company whose staff member can be in following forms:

- Employee
  - Salaried employee
  - Commission employee
  - Piece worker
- Intern



Base Class: StaffMember

- Data Attributes:
  - companyID
  - name
  - surname
- Constructor to initialize all data attributes except companyID via keyboard. CompanyID will be given as an input parameter while creating objects(a unique id for each object, in ascending order).
- Methods:
  - get and set methods for companyID, name and surname
  - print method to print all data attributes (**virtual method**)

First-level Derived Class: Intern

- Additional data attributes:
  - schoolName
- Constructor to initialize base class data attributes (except companyID) and schoolName with information taken via keyboard
- Additional Methods:
  - get and set methods for schoolName
- Polymorphic Methods:
  - print method to print base class data attributes and schoolName

First-level Derived Class: Employee

- Additional data attributes:
  - socialSecurityNumber
- Constructor to initialize base class data attributes (except companyID) and socialSecurityNumber with information taken via keyboard
- Additional Methods:
  - get and set methods for socialSecurityNumber
- Polymorphic Methods:
  - print method to print base class data attributes and socialSecurityNumber
  - pay method to calculate and return the amount of payment (**pure virtual method**)

Second-level Derived Class: SalariedEmployee

- Additional data attributes:
  - weeklySalary
- Constructor to initialize base class data attributes (except companyID) and weeklySalary with information taken via keyboard
- Additional Methods:
  - get and set methods for weeklySalary
- Polymorphic Methods:
  - print method to print base class data attributes and weeklySalary
  - pay method to calculate and return amount of payment

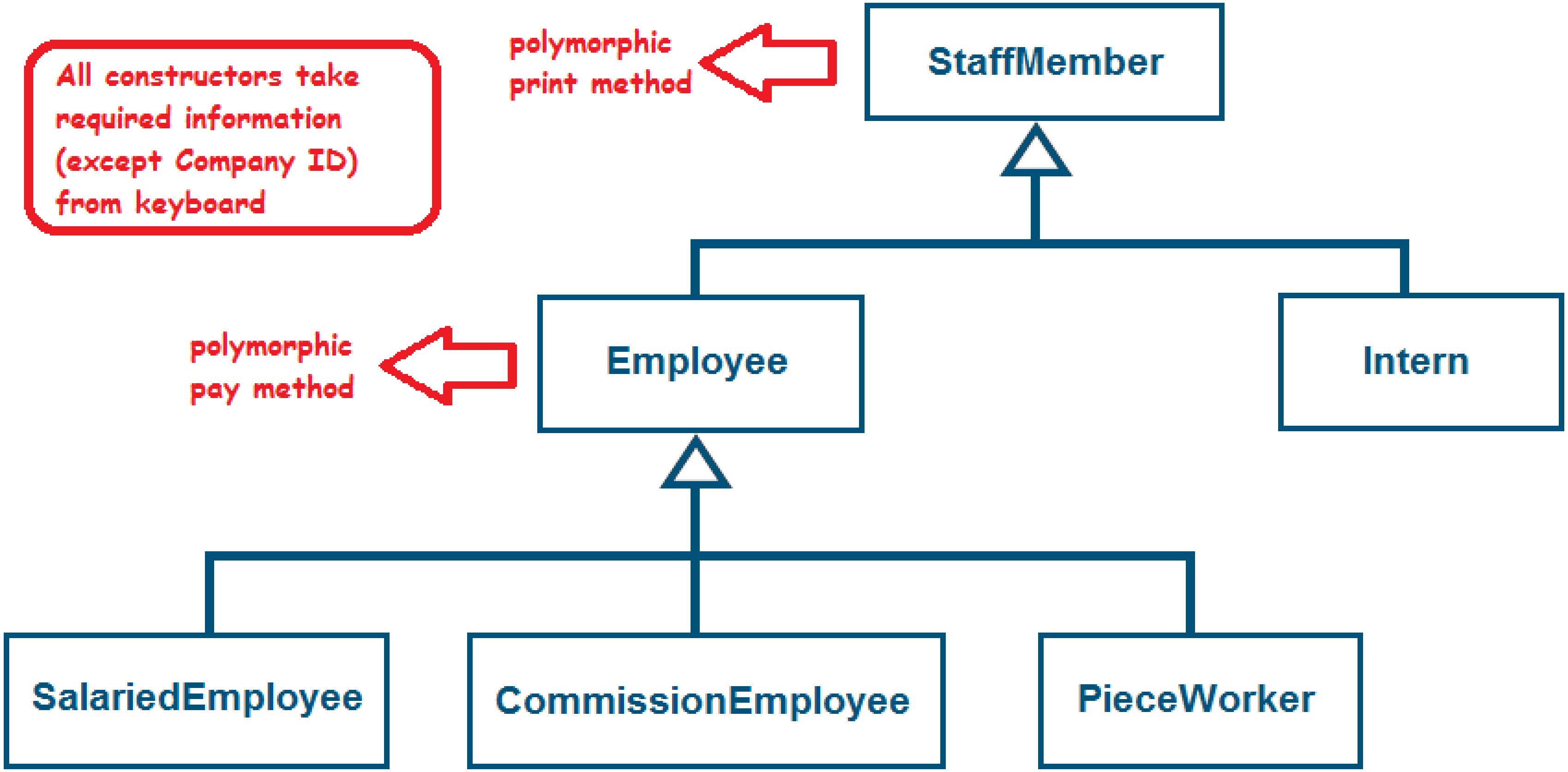
Second-level Derived Class: CommissionEmployee

- Additional data attributes:
  - commissionRate
  - weeklySales
- Constructor to initialize base class data attributes (except companyID), commissionRate and weeklySales with information taken via keyboard
- Additional Methods:
  - get and set methods for commissionRate and weeklySales
- Polymorphic Methods:
  - print method to print base class data attributes, commissionRate and weeklySales
  - pay method to calculate and return amount of payment

Second-level Derived Class: PieceWorker

- Additional data attributes:
  - wagePerPiece
  - piecesProduced
- Constructor to initialize base class data attributes (except companyID), wagePerPiece and piecesProduced with information taken via keyboard
- Additional Methods:
  - get and set methods for wagePerPiece and piecesProduced
- Polymorphic Methods:
  - print method to print base class data attributes, wagePerPiece and piecesProduced
  - pay method to calculate and return amount of payment

To Sum Up



All constructors take required information (except Company ID) from keyboard
polymorphic print method
StaffMember
polymorphic pay method
Employee
Intern
SalariedEmployee
CommissionEmployee
PieceWorker

Test Program

```
// creating an array of pointers to address staff member to benefit from polymorphism
StaffMember *sm[5];
char option;

// getting information of which type of staff member to add from user
// and creating object from that type
for(int i=0;i<5;i++){
   cout<<"Please choose type of staff member to add?"<<endl;
   cout<<"Salaried Employee[s]"<<endl;
   cout<<"Commission Employee[c]"<<endl;
   cout<<"Piece Worker[p]"<<endl;
   cout<<"Intern[i]"<<endl;
   cout<<"------------------------------------------------"<<endl;
   cin>>option;
```

Test Program

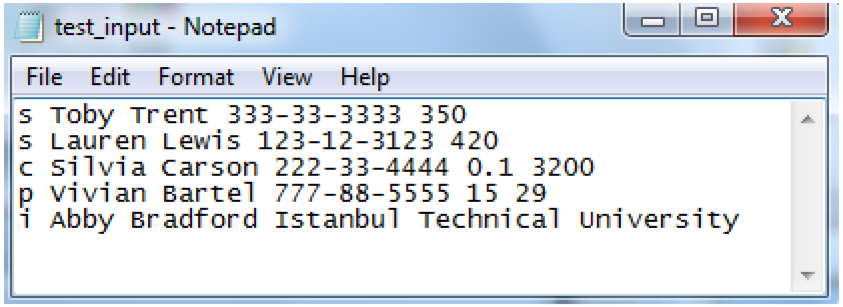
```
    switch(option){
        case 's':
            cout<<"Enter required information for the new salaried employee:"<<endl;
            cout<<"----------------------------------------------------------"<<endl;
            sm[i] = new SalariedEmployee(i+1);
            break;
        case 'c':
            cout<<"Enter required information for the new commission employee:"<<endl;
            cout<<"------------------------------------------------------------"<<endl;
            sm[i] = new CommissionEmployee(i+1);
            break;
        case 'p':
            cout<<"Enter required information for the new piece worker:"<<endl;
            cout<<"-----------------------------------------------------"<<endl;
            sm[i] = new PieceWorker(i+1);
            break;
        case 'i':
            cout<<"Enter required information for the new intern:"<<endl;
            cout<<"---------------------------------------------------"<<endl;
            sm[i] = new Intern(i+1);
            break;
        default:
            cout<<"Wrong option"<<endl;
    }
}
```

Test Program

```
// use polymorphic print method(and polymorphic pay method inside print) to print
// information of different types of staff member
for(int i=0;i<5;i++){
    cout<<endl;
    cout<<"Staff Member "<<i+1<<endl;
    cout<<"-----------------------------------------------------"<<endl;
    sm[i]->print();
    delete sm[i];   // give allocated space back
}
```

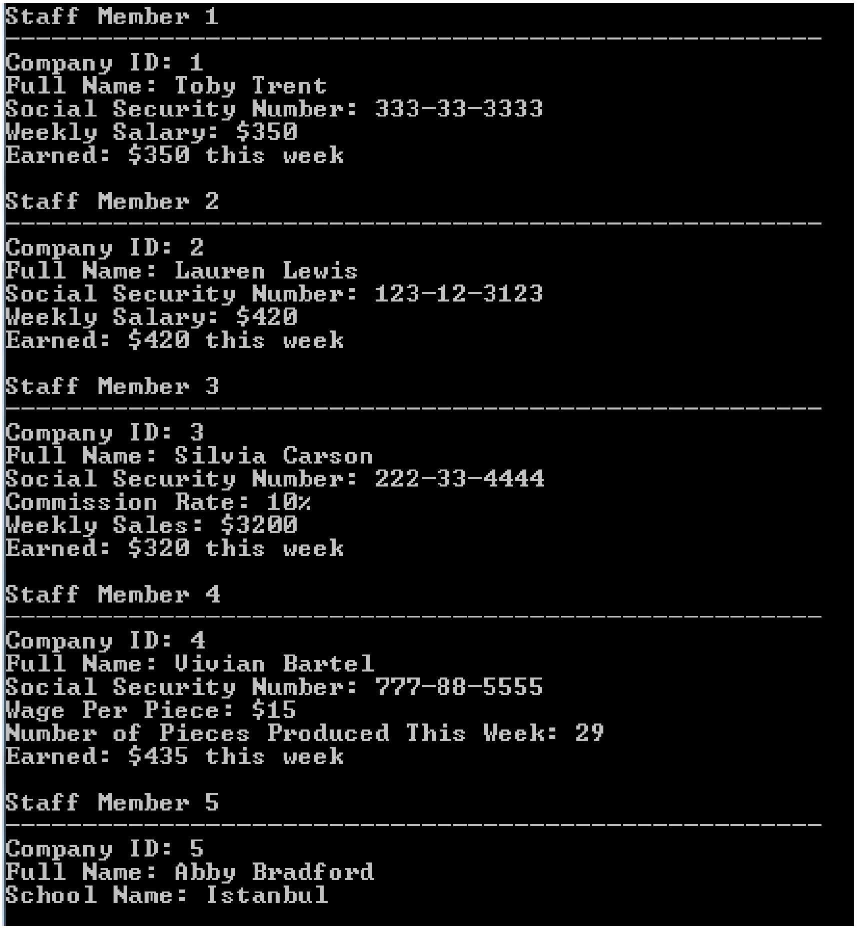
Example Input and Output

- A text file can be used instead of standart input(keyboard) during execution as:
  - ps2.exe < test_input.txt
- Contents of the example text file:



```
s Toby Trent 333-33-3333 350
s Lauren Lewis 123-12-3123 420
c Silvia Carson 222-33-4444 0.1 3200
p Vivian Bartel 777-88-5555 15 29
i Abby Bradford Istanbul Technical University
```

- **Output:**



```
Staff Member 1
-----------------------------------------------------
Company ID: 1
Full Name: Toby Trent
Social Security Number: 333-33-3333
Weekly Salary: $350
Earned: $350 this week

Staff Member 2
-----------------------------------------------------
Company ID: 2
Full Name: Lauren Lewis
Social Security Number: 123-12-3123
Weekly Salary: $420
Earned: $420 this week

Staff Member 3
-----------------------------------------------------
Company ID: 3
Full Name: Silvia Carson
Social Security Number: 222-33-4444
Commission Rate: 10%
Weekly Sales: $3200
Earned: $320 this week

Staff Member 4
-----------------------------------------------------
Company ID: 4
Full Name: Vivian Bartel
Social Security Number: 777-88-5555
Wage Per Piece: $15
Number of Pieces Produced This Week: 29
Earned: $435 this week

Staff Member 5
-----------------------------------------------------
Company ID: 5
Full Name: Abby Bradford
School Name: Istanbul
```