

Lecture 05

- Abstraction
- Encapsulation

Abstraction

- Abstraction is a way to cope with complexity.
- Principle of abstraction:

“Capture only those details about an object that are relevant to current perspective”

Example – Abstraction

Ali is a PhD student and teaches BS students

- Attributes

- | | |
|-------------------|---------------|
| - Name | - Employee ID |
| - Student Roll No | - Designation |
| - Year of Study | - Salary |
| - CGPA | - Age |

Example – Abstraction

Ali is a PhD student and teaches BS students

- behaviour

- | | |
|------------------|---------------|
| - Study | - DevelopExam |
| - GiveExam | - TakeExam |
| - PlaySports | - Eat |
| - DeliverLecture | - Walk |

Example – Abstraction

Student's Perspective

- Attributes

- | | |
|-------------------|---------------|
| - Name | - Employee ID |
| - Student Roll No | - Designation |
| - Year of Study | - Salary |
| - CGPA | - Age |

Example – Abstraction

Student's Perspective

- behaviour

- | | |
|------------------|---------------|
| - Study | - DevelopExam |
| - GiveExam | - TakeExam |
| - PlaySports | - Eat |
| - DeliverLecture | - Walk |

Example – Abstraction

Teacher's Perspective

- Attributes

- | | |
|-------------------|---------------|
| - Name | - Employee ID |
| - Student Roll No | - Designation |
| - Year of Study | - Salary |
| - CGPA | - Age |

Example – Abstraction

Teacher's Perspective

- behaviour

- | | |
|------------------|---------------|
| - Study | - DevelopExam |
| - GiveExam | - TakeExam |
| - PlaySports | - Eat |
| - DeliverLecture | - Walk |

Example – Abstraction



Driver's View

Engineer's View



Abstraction – Advantages

- Simplifies the model by hiding irrelevant details
- Abstraction provides the freedom to defer implementation decisions by avoiding commitment to details

Information Hiding

- Information is stored within the object
- It is hidden from the outside world
- It can only be manipulated by the object itself

Example – Information Hiding

- Ali's name is stored within his brain
- We can't access his name directly
- Rather we can ask him to tell his name

Example – Information Hiding

- A phone stores several phone numbers in SIM card
- We can't read the numbers directly from the SIM card
- Rather phone-set reads this information for us

Information Hiding Advantages

- Simplifies the model by hiding implementation details
- It is a barrier against change propagation
- Accidental Access or manipulation
- Illegal access or manipulation

Encapsulation

- First principle of Object Oriented Paradigm.
- Data and behavior are tightly coupled inside an object
- Both the information structure and implementation details of its operations are hidden from the outer world

Example – Encapsulation

- Ali stores his personal information and knows how to translate it to the desired language
- We don't know
 - How the data is stored
 - How Ali translates this information

Example – Encapsulation

- A Phone stores phone numbers in digital format and knows how to convert it into human-readable characters
- We don't know
 - How the data is stored
 - How it is converted to human-readable characters

Encapsulation – Advantages

- Simplicity and clarity
- Low complexity
- Better understanding



Quiz coming next week