



OOPS.

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Something that has State (data), Behaviour (actions), Identity and Responsibility.

State: values given to the attributes of an object.

Behaviour: Response given to the outside world.

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Examples of Object

1) Car (Object)	2) Student (Object)
State (data)	State (data)
<ul style="list-style-type: none">• Color• Speed• Model	<ul style="list-style-type: none">• Name• Age roll no• Mar 123
Behaviour (action)	Behaviour (action)
<ul style="list-style-type: none">• Start()• Stop()• Accelerate()• Brake()	<ul style="list-style-type: none">• Study()• Given exam()• Submit Assignment()
Identity (Uniqueness)	Identity (Uniqueness)
<ul style="list-style-type: none">• Reg number	<ul style="list-style-type: none">• Unique roll no or admission no
Responsibility (Role)	Responsibility (Role)
<ul style="list-style-type: none">• Used for transportation	<ul style="list-style-type: none">• attend class• complete course work



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3) mobile phone (object)
State (data)

- brand
- battery
- Storage

Behavior (action)

- call()
- message()
- take photo()

Identity (uniqueness)

- IMEI number

Responsibility (Role)

- Communication
- entertainment

4) Bank Account (object)
State (data)

- Name
- balance
- account type

Behavior (action)

- Deposit()
- Withdraw()
- check balance()

Identity (uniqueness)

- Account Number

Responsibility (Role)

- Store money
- handle transaction



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5) Television (Object) State (data) <ul style="list-style-type: none">brand.Size.Channel. Behavior (action) <ul style="list-style-type: none">turn on ()change channel () Identity (unique) <ul style="list-style-type: none">Serial number. Responsibility: <ul style="list-style-type: none">display video content	7) Employee (Object) State (data) <ul style="list-style-type: none">name, id, Salary. Behavior (action) <ul style="list-style-type: none">work (), attend meeting () Identity (unique) <ul style="list-style-type: none">Employee ID. Responsibility (Role) <ul style="list-style-type: none">perform task.
6) BOOK (Object) State (data) <ul style="list-style-type: none">titleauthorpages. Behavior (action): Open (), read () Identity (unique) ISBN number. Responsibility (Role) Knowledge	8) Laptop (Object) State (data) <ul style="list-style-type: none">RAM, processor, battery Behavior (action) <ul style="list-style-type: none">run program (), shutdown () Identity (unique) <ul style="list-style-type: none">Serial number.Com. Responsibility <ul style="list-style-type: none">Computing task.



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9) Pen (object)

State (data) : Color, ink level, brand.

Behaviour (action) : Write ()

Identity : model number.

Responsibility : Write text.

10) Fan (object)

State : Speed, brand, Size.

Behaviour : rotate (), turn on (), turn off ()

Identity : Serial number.

Responsibility : provide cooling.



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2. Abstraction.

write the definition of abstraction 10 times

- [illegible]



Examples of abstraction.

- 1) Mobile phone: you can see only call, camera
internal circuits, processors \rightarrow hidden.
- 2) ATM machine: you press withdraw 500₹
Backend tasks \rightarrow hidden.
- 3) Google maps: you see a simple map and directions
Complex algorithm, GPS tracking \rightarrow hidden.
- 4) Car driving: you use steering, brakes, accelerator
Engine mechanism, fuel \rightarrow hidden.
- 5) TV Remote: you press volume \rightarrow it increases
internal circuits, IR signals \rightarrow hidden.
- 6) Washing machine: you select wash mode, start
water level control, motor speed \rightarrow hidden.
- 7) Restaurant menu: you see only the menu items
you don't see how they cook, kitchen \rightarrow hidden.
- 8) Elevator: you press a button \rightarrow floor changes
motor, counterweight, braking system \rightarrow hidden.



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9) Web Browser:-

You type a URL and press enter
DNS / TCP / IP, Rendering engine - hidden.

10) Camera App:-

You click a photo
focus, aperture, Shutter speed adjustment
→ hidden.



3) Encapsulation.

- Binding + hiding data and behaviour by default
Binding because they are inseparable in real life, and they are also hidden in real life.
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Examples of encapsulation.

- 1) Bank Account:
Balance is private, accessed only through deposit/withdrawal methods.
- 2) Student class.
name / age kept private, changed only through getters / setters.
- 3) Car Speed.
Speed variable is private you can increase it only using accelerate.
- 4) Employee Salary.
Salary is hidden; only HR methods can update or view it.
- 5) ATM PIN.
PIN is private; only verify pin() can check it.
- 6) Mobile phone.
Battery percentage is hidden; you can only charge or use battery through methods.



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- 7) Hospital patient Record.
Patient's medical history is private; only doctor method can access/update it
8. Online Shopping Cart.
Cart total is private; only addItem() or removeItem() can modify it
9. Game Character
Health points private; only takeDamage() or heal() can change it
10. Email Account.
Password is private; only login() method checks it



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Inheritance:

- [illegible]



Examples of Inheritance.

- 1) Dog is a Animal.
Parent class: Animal.
Child class: Dog.
- 2) Car is a Vehicle.
Parent class: Vehicle.
Child class: Car.
- 3) ~~Saving is a~~ Account is a Bank Account.
Parent class: Bank Account.
Child class: Saving Account.
- 4) Teacher is a Person.
Parent class: Person.
Child class: Teacher.
- 5) Manager is a Employee.
Parent class: Employee.
Child class: Manager.
- 6) Mobile phone is a electronic device.
Parent class: electronic device.
Child class: Mobile phone.



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7) Refrigerator is a Appliance.
Parent class: Appliance.
Child class: Refrigerator.

8) Truck is a heavy vehicle.
Parent class: heavy vehicle.
Child class: Truck.

9) Guest user is a user.
Parent class: User.
Child class: Guest user.

10) Online order is a Order.
Parent class: Order.
Child class: online order.



* Polymorphism.

- : Same message, given to generalize things, to perform same action but implemented differently.
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§ Examples of polymorphism

- 1) "Start()" action.
 - Car \rightarrow Start with Key.
 - bike \rightarrow Start with Ricks.
- 2) "Draw()" action.
 - Circle \rightarrow Draw a Circle.
 - Square \rightarrow Draw a Square.
- 3) "makeSound()" for animal.
 - Dog \rightarrow bark.
 - cow \rightarrow meow.
- 4) "pay()" in payment system.
 - pay via Upi.
 - pay via Card.



- 5) "Send message ()"
 - Email -> Send mail
 - Sms -> Send text
- 6) "calculatearea ()"
 - Rectangle: length \times width.
 - Circle: πr^2 .
- 7) "print ()"
 - print on paper.
 - print in PDF.
- 8) "Open ()"
 - open a door -> push / pull.
 - Open a program -> run executable.
- 9) "move ()"
 - Human - walks.
 - Bird - flies.
- 10) "login ()"
 - login with password.
 - login with OTP
 - login with fingerprint