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Practical - 04.

* **Aim:** Write a program in solidity to create Student data. Use the following constructs -
  - Structures
  - arrays.
  - Fall back.

Deploy this as smart contract on Ethereum and Observe the transaction fee and Gas values.

* **Theory:**

1] **Key constructs -**

- Structures : struct student stores student details (id, name, age, course).
- Arrays :
  Student[] students is a dynamic array holding multiple student records.
- Fallback function : fallback() is invoked if someone sends Ether or calls a function that does not exist.
- Receive function : receive() allows receiving ether via direct transfer.

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2] Deployment steps (short)

- Install metamask and connect to a test network. (eg. goerly, sepolia).
- Fund Metamask with test ETH via a faucet.
- Open Remix IDE.
- Create a file studentdata.sol and write code.
- Compile using solidity compiler v0.8.x.
- Deploy using Injected Web3 (connects remix to Meta Mask).
- Interact with function:
  - addStudent() to insert student data
  - getStudent() to view student data.
  - getTotalStudents() to check array length.
  - Send ether to the contract to test fallback / receive.

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3) Observing transaction fee and Gas:

- Each transaction consumes gas.
- Before confirming a transaction in Metamask, it shows estimated gas fee.
- After execution you can check actual gas used and transaction fee in ETH on etherscan (via transaction hash).
- Example -
  - Adding a student may use ~ 70,000 - 90000 gas (depends on the string length).
  - Sending ether directly triggers receive() or fallback() with gas ~ 21000 for simple transfers -

* CONCLUSION:

The smart contract was successfully created and deployed on an ethereum test network. Student data can be added and retrieved using structures and arrays. while the fallback function allows the contract to receive Ether.

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Transaction fees and gas values can be observed for each operation via Metamask and Ethereum etherscan. illustrating the cost of storing and managing data on the blockchain.

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