ERC20 Tokens - allowed, transferFrom() and approve()

- transfer() function is used to send tokens from one user to another, but it doesn't work well when tokens are being used to pay for a function in a smart contract;

- **ERC20** standard defines a mapping data structure named allowed and 2 functions approve(...) and transferFrom(...) that permit a token owner to **give another address approval to transfer up to a number of tokens** known as allowance;

- Allowances for an address can only be set by the token owner;

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Imagine there are 2 users **A** and **B. A has 1000 tokens and wants to give permission to B to spend 100 of them**.

1. A will call approve(address_of_B, 100). After that the allowed data structure will contain the following information: allowed[address_of_A][address_of_B] = 100
2. If **B** wants later to transfer 20 tokens from **A** to another account, **B** will execute the transferFrom() function in this way: transferFrom(address_of_A, recipient_address, 20).

After calling the transferFrom() function (by **B - msg.sender**) the balance of **A** decreased by 20 and the balance of the recipient increased by 20 tokens and the **allowed** mapping will contain the following info:
allowed[address_of_A][address_of_B] = 80