Audit report of CarbonCredit

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Prepared On: - 07/03/2024.

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1. Disclaimer

The smart contracts given for audit have been analyzed in accordance with the best industry practices at the date of this report, in relation to cybersecurity vulnerabilities and issues in smart contract source code, the details of which are disclosed in this report, (Source Code); the Source Code compilation, deployment, and functionality (performing the intended functions). Because the total numbers of test cases are unlimited, the audit makes no statements or warranties on the security of the code.

It also cannot be considered as a sufficient assessment regarding the utility and safety of the code, bug-free status, or any other statements of the contract. While we have done our best in conducting the analysis and producing this report, it is important to note that you should not rely on this report only - we recommend proceeding with several independent audits and a public bug bounty program to ensure the security of smart contracts.

Smart contracts are deployed and executed on a blockchain platform. The platform, its programming language, and other software related to the smart contract can have their own vulnerabilities that can lead to hacks. Thus, the audit can't guarantee explicit security of the audited smart contracts.

2. Introduction

Kishan Patel (Consultant) was contacted by Danny Wirken. (Customer) to conduct a Smart Contracts Code Review and Security Analysis. This report presents the findings of the security assessment of Customer`s smart contracts and its code review conducted between 07/03/2024 – 09/03/2024.

The project has 1 file. It contains approx 700 lines of Solidity code. All the functions and state variables are well commented on using the natspec documentation, but that does not create any vulnerability.

3. Project information

Token Name	Carbon Credit
Token Symbol	CO2
Platform	Polygon
Order Started Date	07/03/2024
Order Completed Date	09/03/2024

4. List of attacks checked

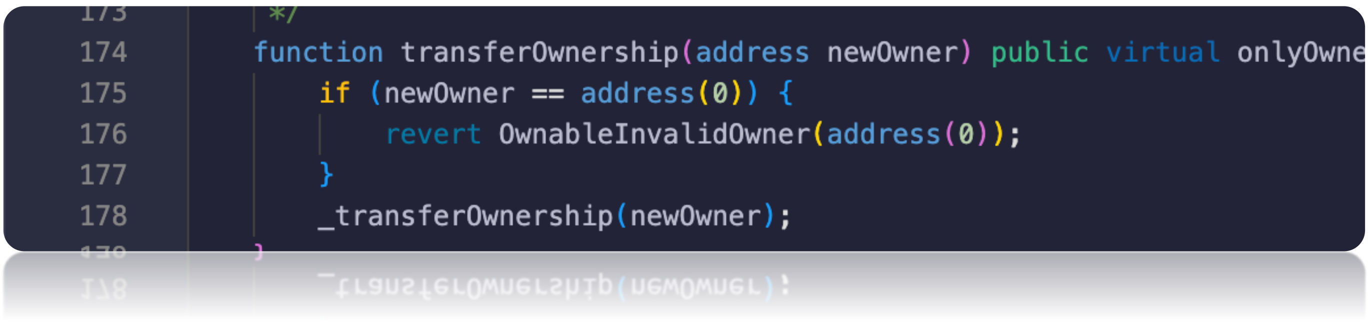
- Over and under flows
- Short address attack
- Visibility & Delegate call
- Reentrancy / TheDAO hack
- Forcing BNB to a contract
- Timestamp Dependence
- Gas Limit and Loops
- DoS with (Unexpected) Throw
- DoS with Block Gas Limit
- Transaction-Ordering Dependence
- Byte array vulnerabilities
- Style guide violation
- Transfer forwards all gas
- ERC20 API violation
- Malicious libraries
- Compiler version not fixed
- Unchecked external call - Unchecked math
- Unsafe type inference

5. Severity Definitions

Risk	Level Description
Critical	Critical vulnerabilities are usually straightforward to exploit and can lead to tokens loss etc.
Medium	Medium-level vulnerabilities are important to fix; however, they can’t lead to tokens lose
Low	Low-level vulnerabilities are mostly related to outdated, unused etc. code snippets, that can’t have significant impact on execution

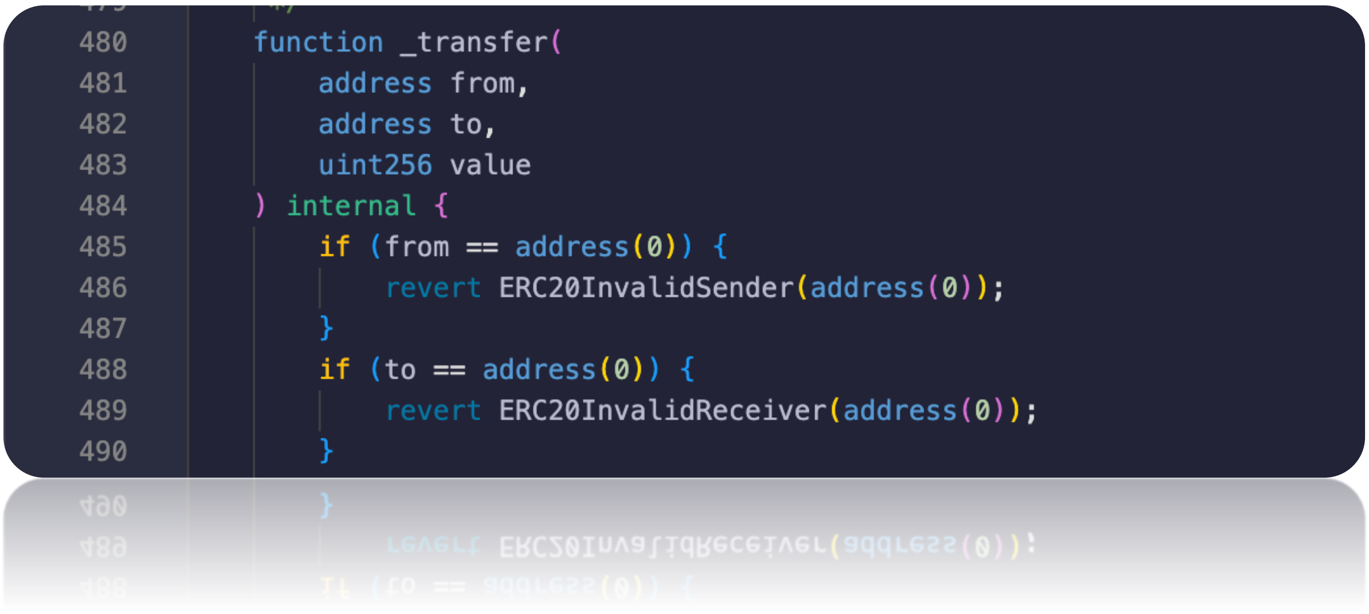
6. Good things in code

- **Good required condition in functions:-**
  - Here smart contract is checking that newOwner address is valid and proper.



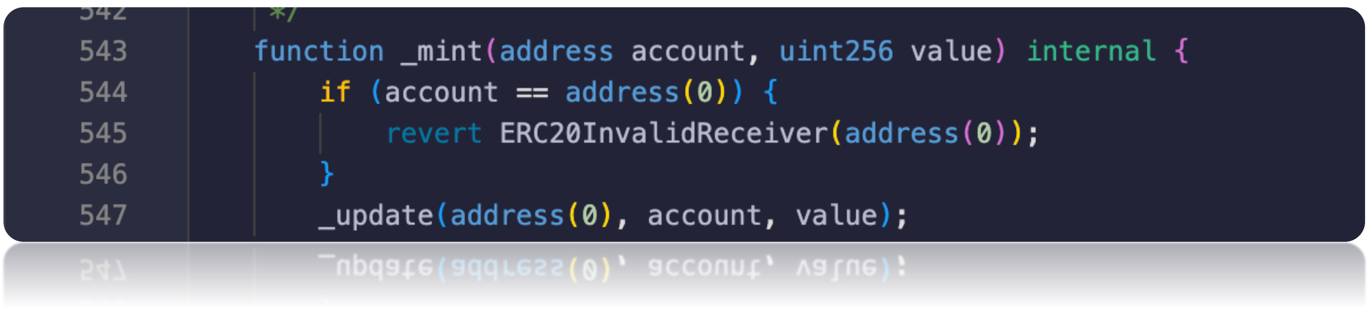
```
    function transferOwnership(address newOwner) public virtual onlyOwne
        if (newOwner == address(0)) {
            revert OwnableInvalidOwner(address(0));
        }
        _transferOwnership(newOwner);
```

  - Here smart contract is checking that from and to addresses are valid and proper.

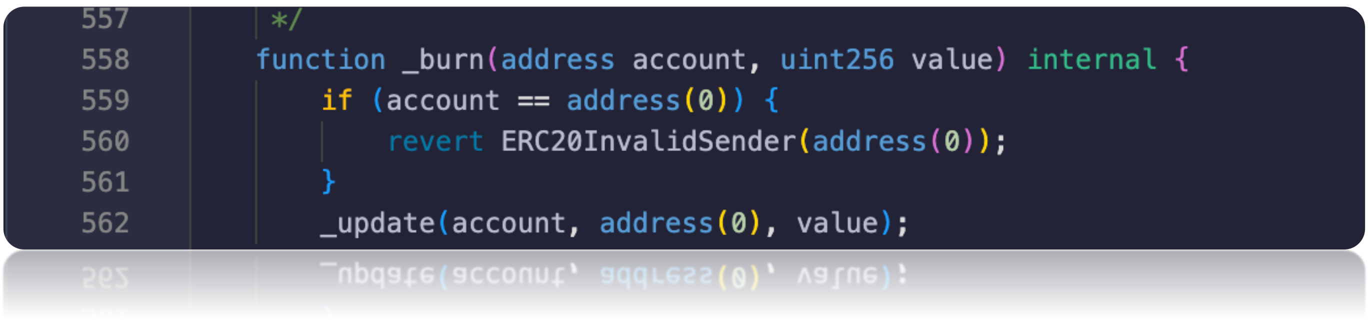


```
    function _transfer(
        address from,
        address to,
        uint256 value
    ) internal {
        if (from == address(0)) {
            revert ERC20InvalidSender(address(0));
        }
        if (to == address(0)) {
            revert ERC20InvalidReceiver(address(0));
        }
```

- Here smart contract is checking that account address is valid and proper.

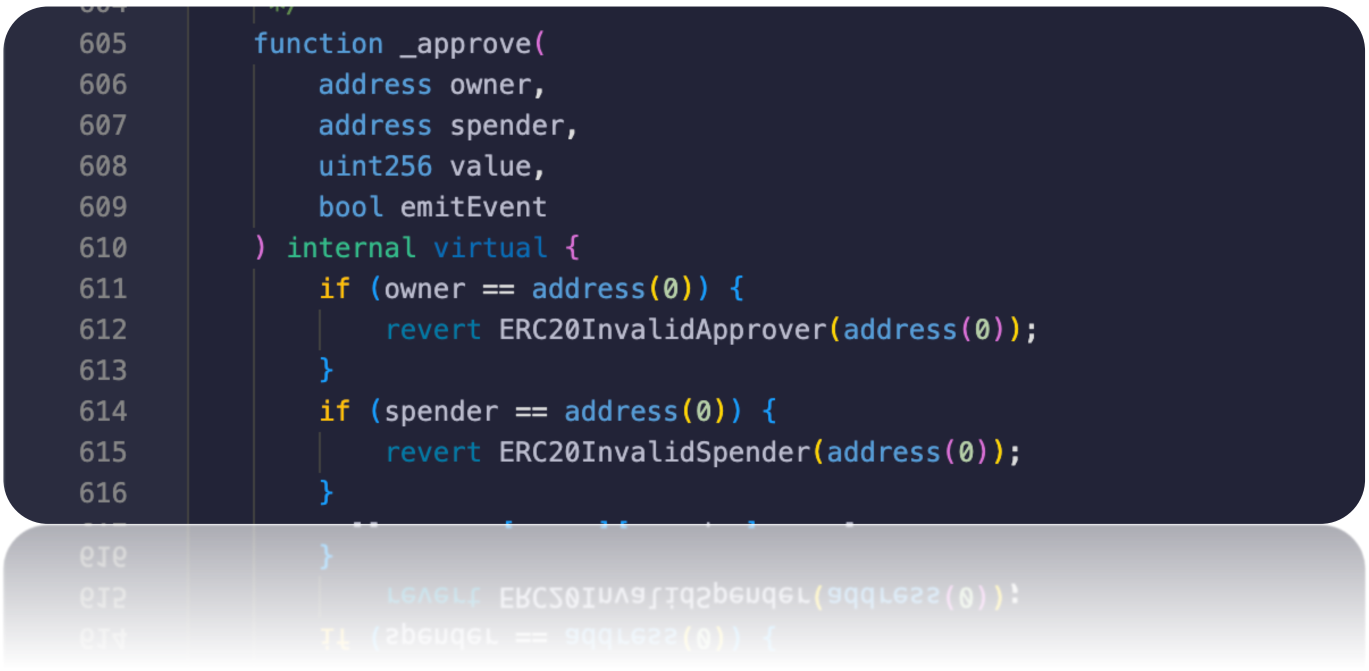


```
    function _mint(address account, uint256 value) internal {
        if (account == address(0)) {
            revert ERC20InvalidReceiver(address(0));
        }
        _update(address(0), account, value);
```



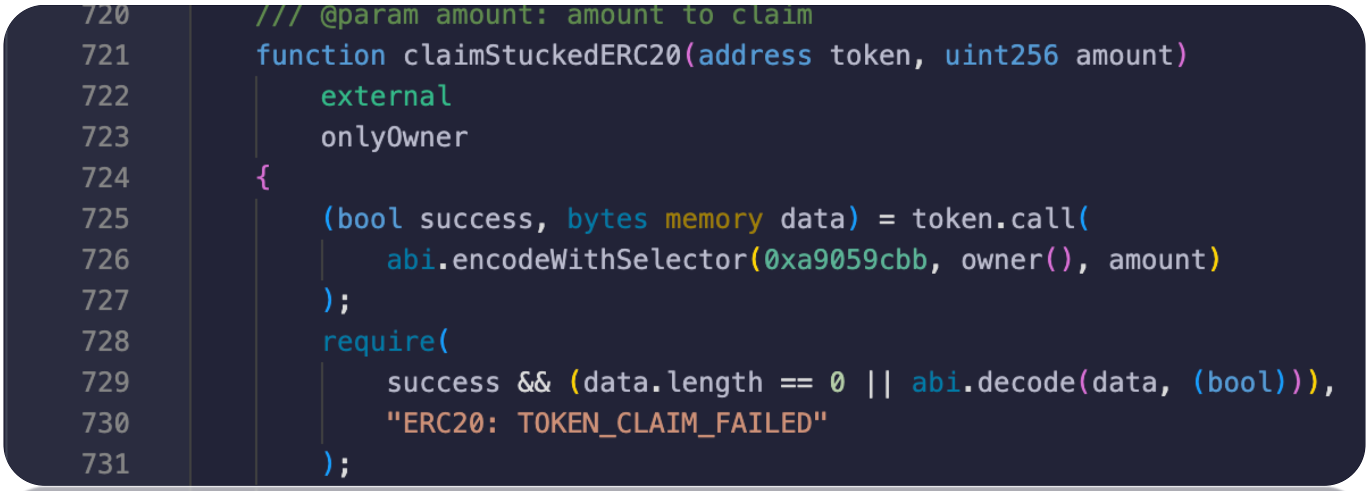
```
    */
    function _burn(address account, uint256 value) internal {
        if (account == address(0)) {
            revert ERC20InvalidSender(address(0));
        }
        _update(account, address(0), value);
```

- Here smart contract is checking that owner and spender addresses are valid and proper.



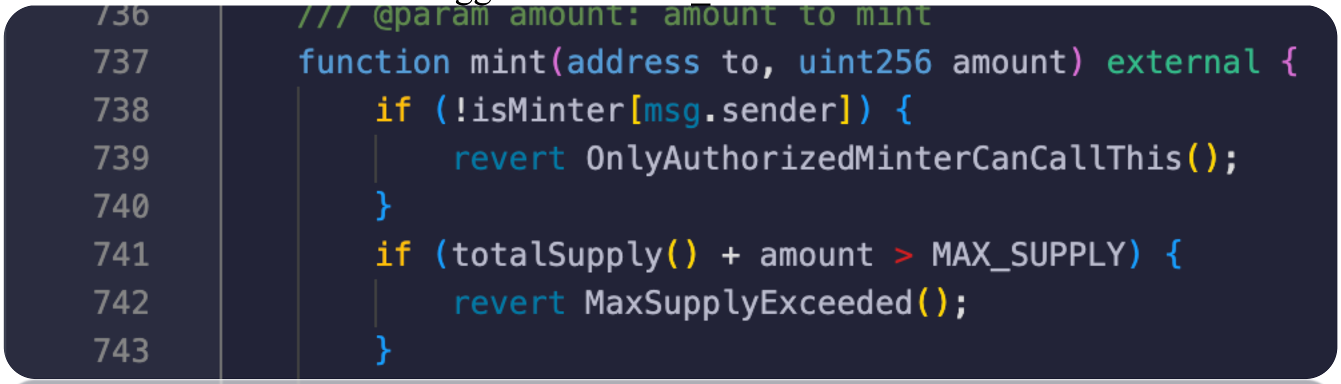
```
    function _approve(
        address owner,
        address spender,
        uint256 value,
        bool emitEvent
    ) internal virtual {
        if (owner == address(0)) {
            revert ERC20InvalidApprover(address(0));
        }
        if (spender == address(0)) {
            revert ERC20InvalidSpender(address(0));
        }
```

- Here smart contract is checking that transfer to owner is successfully done or not.



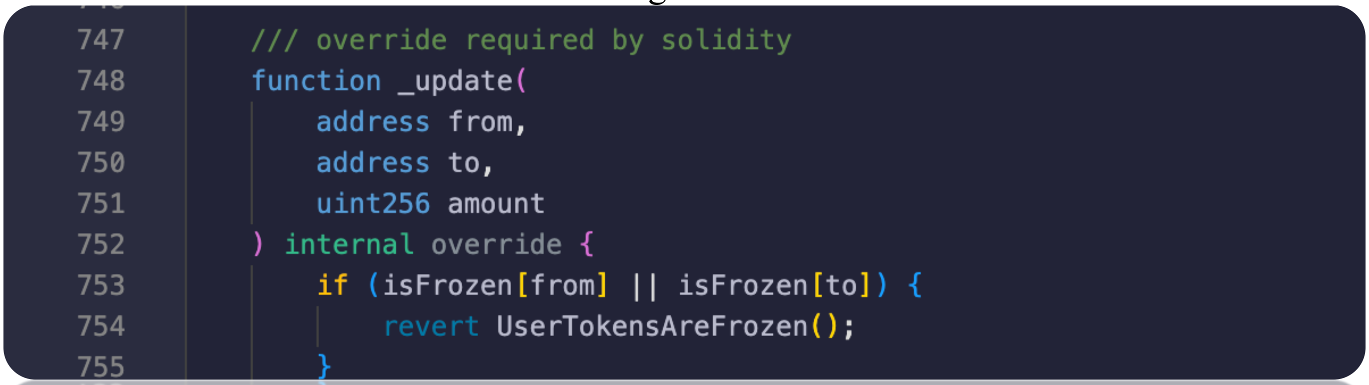
```
    /// @param amount: amount to claim
    function claimStuckedERC20(address token, uint256 amount)
        external
        onlyOwner
    {
        (bool success, bytes memory data) = token.call(
            abi.encodeWithSelector(0xa9059cbb, owner(), amount)
        );
        require(
            success && (data.length == 0 || abi.decode(data, (bool))),
            "ERC20: TOKEN_CLAIM_FAILED"
        );
```

- Here smart contract is checking that msg.sender is minter or not, totalSupply + amount is not bigger than MAX_SUPPLY.



```
    /// @param amount: amount to mint
    function mint(address to, uint256 amount) external {
        if (!isMinter[msg.sender]) {
            revert OnlyAuthorizedMinterCanCallThis();
        }
        if (totalSupply() + amount > MAX_SUPPLY) {
            revert MaxSupplyExceeded();
        }
```

- Here smart contract is checking that from or to addresses is not frozen.



```
    /// override required by solidity
    function _update(
        address from,
        address to,
        uint256 amount
    ) internal override {
        if (isFrozen[from] || isFrozen[to]) {
            revert UserTokensAreFrozen();
        }
```

7. Critical vulnerabilities in code

- No Critical vulnerabilities found

8. Medium vulnerabilities in code

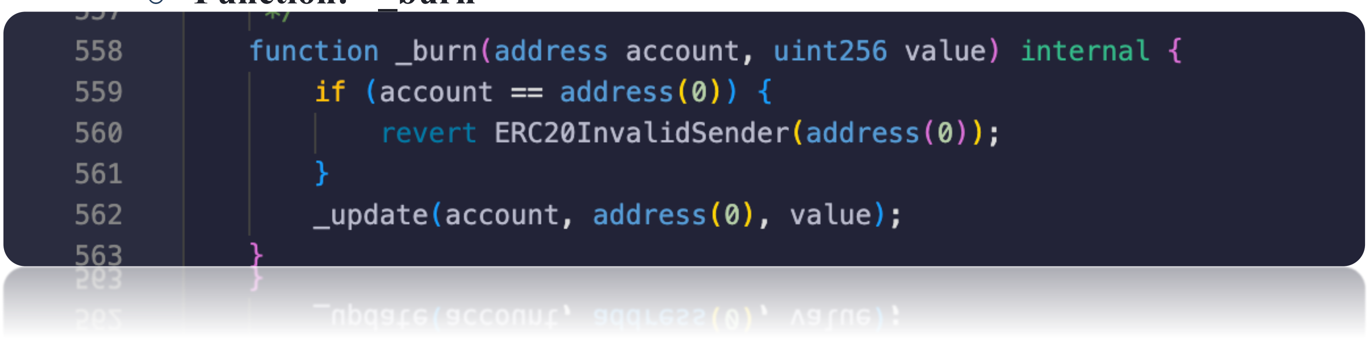
- No Medium vulnerabilities found

9. Low vulnerabilities in code

9.1. Suggestions to add code validations:-

=> You have implemented required validation in contract.
=> There are some place where you can improve validation and security of your code.
=> These are all just suggestion it is not bug.

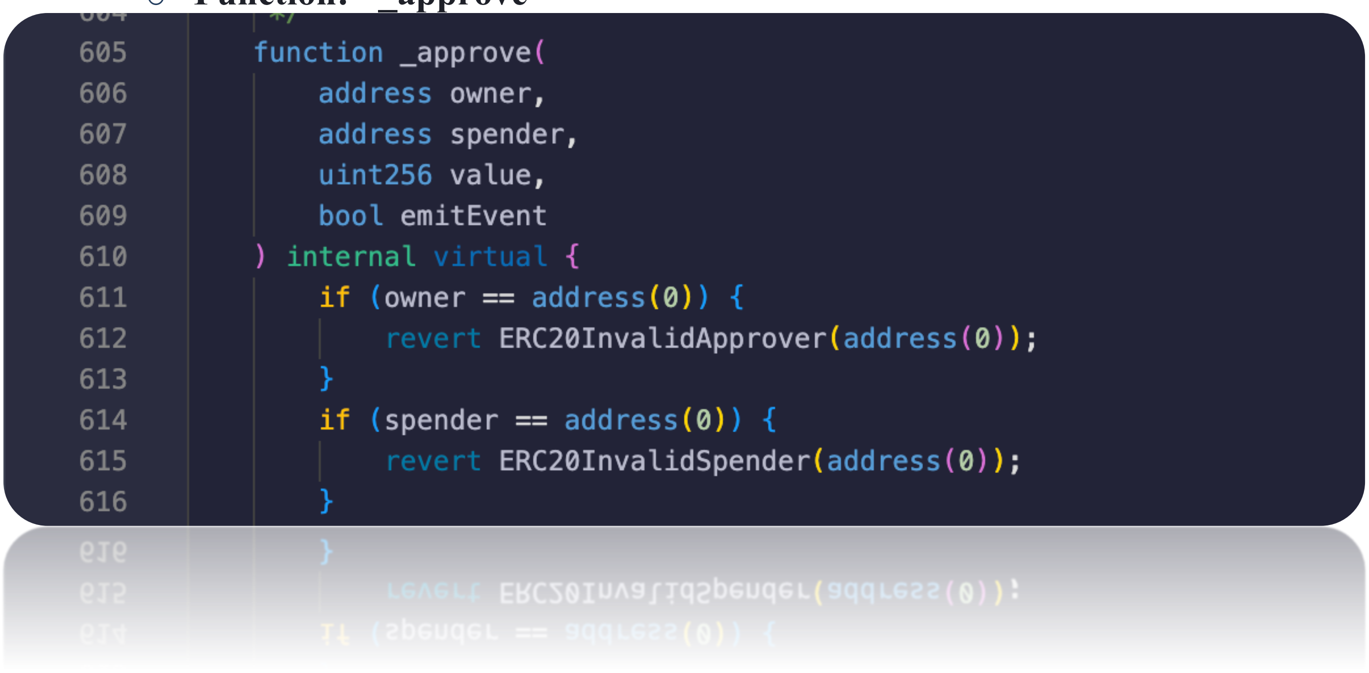
- **Function: - _burn**



```
function _burn(address account, uint256 value) internal {
    if (account == address(0)) {
        revert ERC20InvalidSender(address(0));
    }
    _update(account, address(0), value);
}
```

- Here in _burn function smart contract can check that account address has sufficient balance to burn.

- **Function: - _approve**



```
    function _approve(
        address owner,
        address spender,
        uint256 value,
        bool emitEvent
    ) internal virtual {
        if (owner == address(0)) {
            revert ERC20InvalidApprover(address(0));
        }
        if (spender == address(0)) {
            revert ERC20InvalidSpender(address(0));
        }
```

- Here in _approve function smart contract can check that owner account has sufficient balance to give allowance to spender address.

10. Summary

- **Number of problems in the smart contract as per severity level**

Critical	Medium	Low
0	0	2

According to the assessment, the smart contract code is well secured. The code is written with all validation and all security is implemented. Code is performing well and there is no way to steal funds from this contract.

- **Good Point:** Code performance and quality are good. All kind of necessary validation added into smart contract and all validations are working as excepted.

- **Suggestions:** Please try to implement suggested code validations.