Alireza Yousefian
Github: itsnyx

Mohammad Hossein Pour
Github: M-hoseinpour

Hossein Hamzehzadeh
Github: Hamzeh01

Smart Contracts

References & prerequeres

- A Comprehensive Introduction to Blockchain[Github]
- WEB3 Swap[Github]

Introduction to smart contracts

- Brief explanation of smart contracts📱

- Importance in blockchain technology 🔗

Access Control in smart contract

Access control with ownable contract

- Overview of the **Ownable** contract.⛏️
- Explanation of the **_owner** variable and **onlyOwner** modifier. 🕛
- Demonstration of how **ownership** can be transferred.🚌

Integrating External Data with Chainlink

- ➔ Introduction to **Chainlink** and its role in providing decentralized oracle services.
- ➔ Explanation of the **DataFeeds** contract.
- ➔ Mention of the **AggregatorV3Interface** for price feed interaction.

Utilizing price feed in token presale

➔ How the price feed interacts with the Token Presale contract. 🪙

➔ Importance of accurate pricing in token-related operations. □

➔ The role of the **getBNBLatestPrice** function. 🧾

Security considerations

Ensuring Security in Smart Contracts

Smart Contract Security Features

TokenPresale Contract

- Access Control🦾
- Admin Functionality🤦‍♂️
- Activation/Deactivation Mechanism🎭
- Modifiers for Admin Functions

Ownable Contract

- Ownership Transfer
- OnlyOwner Modifier

DataFeeds Contract

- Immutable Price Feed Address
- Internal Function for Price Retrieval🔏

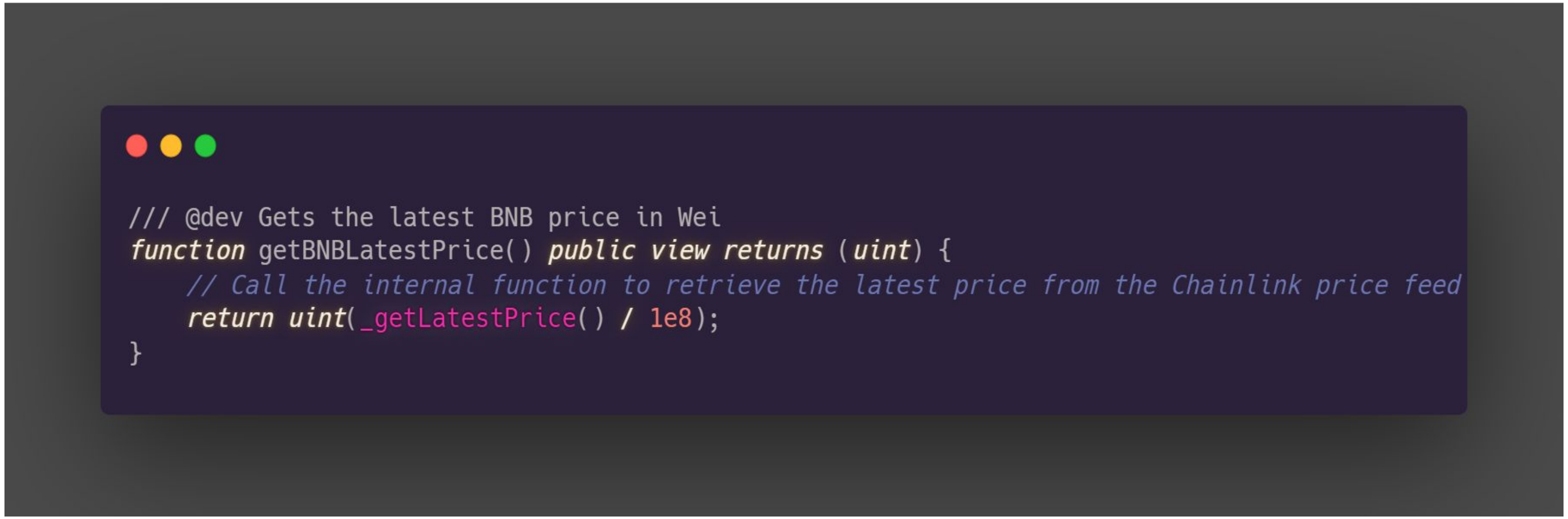
Best Practices for Secure Smart Contract Development

- ➔ Immutable Contracts🧾
- ➔ Access Control🛂
- ➔ Use of Modifiers👻
- ➔ External Dependency Considerations👾
- ➔ Testing and Auditing🧪
- ➔ Gas Limit Considerations⛽
- ➔ Upgradeability Considerations⤴️

Web3 Presale

Retrieving the Latest BNB Price

- ➔ The function calls the internal **_getLatestPrice** function to fetch the most recent price data.
- ➔ The result is then converted to Wei by dividing it by **1e8**, ensuring compatibility with Ethereum's base unit.

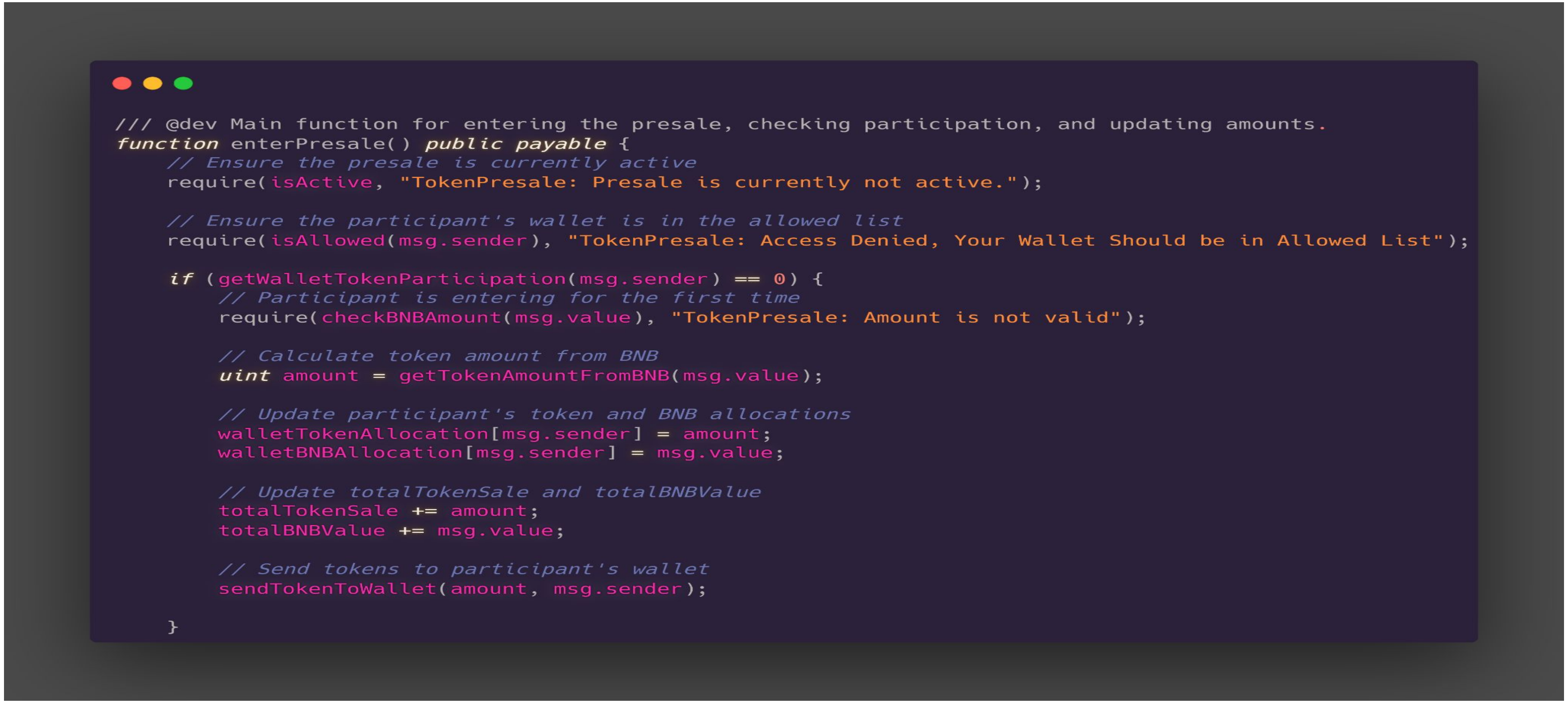


```solidity
/// @dev Gets the latest BNB price in Wei
function getBNBLatestPrice() public view returns (uint) {
    // Call the internal function to retrieve the latest price from the Chainlink price feed
    return uint(_getLatestPrice() / 1e8);
}
```

Participating in the Token Presale

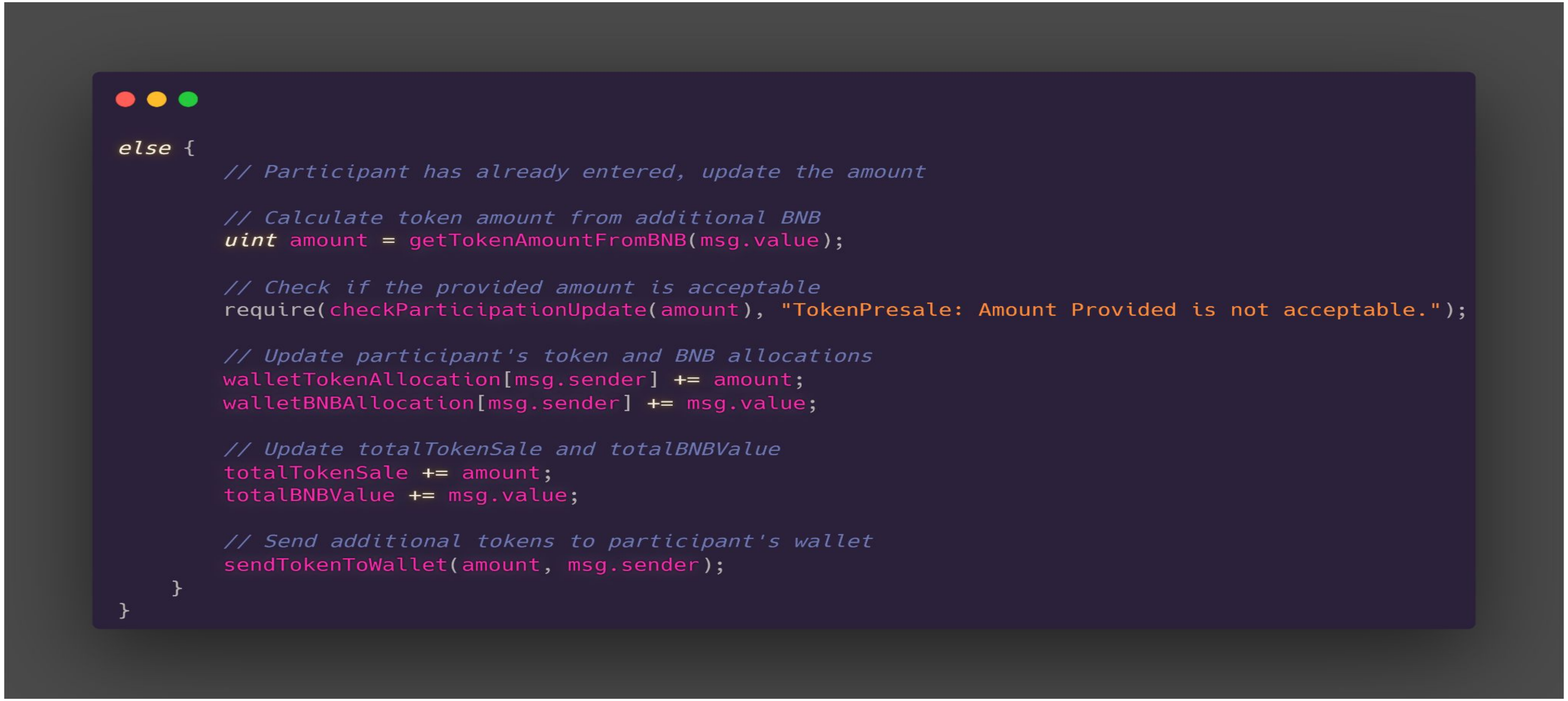
- ➔ Checks if the presale is currently active and if the participant's wallet is allowed.🧧
- ➔ If it's the participant's first entry, calculates token amount from provided BNB and updates allocations.🧮
- ➔ If the participant has already entered, calculates additional token amount, checks if the amount is acceptable, and updates allocations.✔️
- ➔ **Purpose**: This function allows participants to enter the token presale, checking their previous participation and updating token allocations accordingly.

Participating in the Token Presale



```
/// @dev Main function for entering the presale, checking participation, and updating amounts.
function enterPresale() public payable {
    // Ensure the presale is currently active
    require(isActive, "TokenPresale: Presale is currently not active.");

    // Ensure the participant's wallet is in the allowed list
    require(isAllowed(msg.sender), "TokenPresale: Access Denied, Your Wallet Should be in Allowed List");

    if (getWalletTokenParticipation(msg.sender) == 0) {
        // Participant is entering for the first time
        require(checkBNBAmount(msg.value), "TokenPresale: Amount is not valid");

        // Calculate token amount from BNB
        uint amount = getTokenAmountFromBNB(msg.value);

        // Update participant's token and BNB allocations
        walletTokenAllocation[msg.sender] = amount;
        walletBNBAllocation[msg.sender] = msg.value;

        // Update totalTokenSale and totalBNBValue
        totalTokenSale += amount;
        totalBNBValue += msg.value;

        // Send tokens to participant's wallet
        sendTokenToWallet(amount, msg.sender);

    }
```

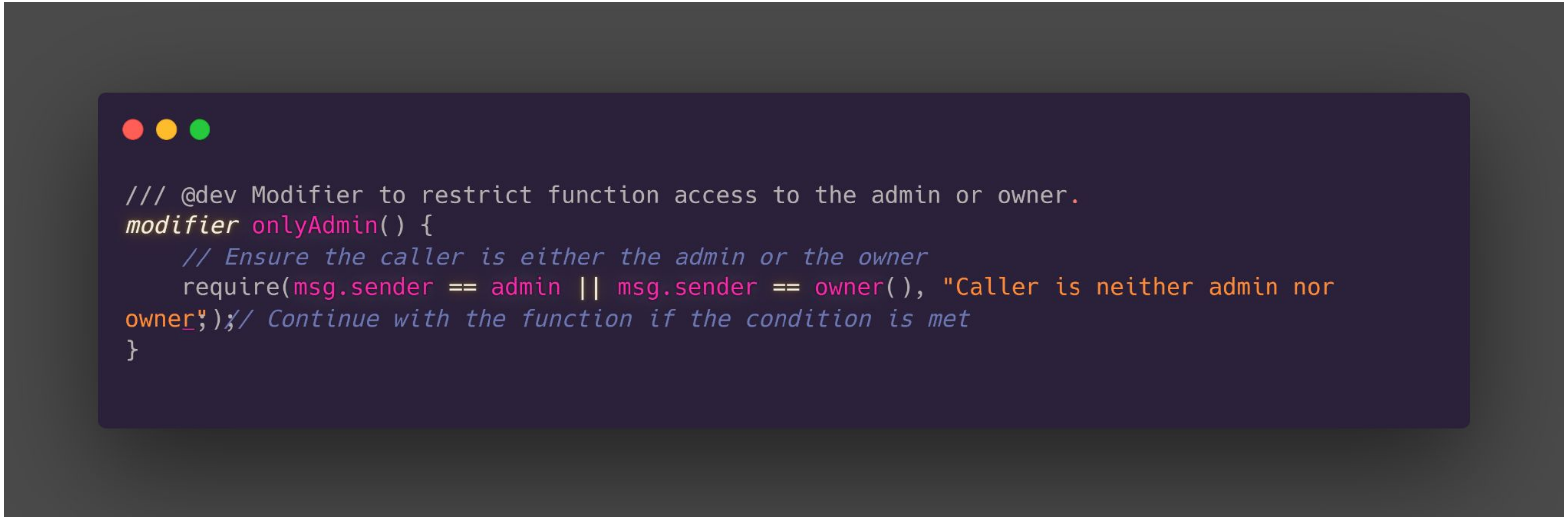
Participating in the Token Presale



```
else {
        // Participant has already entered, update the amount

        // Calculate token amount from additional BNB
        uint amount = getTokenAmountFromBNB(msg.value);

        // Check if the provided amount is acceptable
        require(checkParticipationUpdate(amount), "TokenPresale: Amount Provided is not acceptable.");

        // Update participant's token and BNB allocations
        walletTokenAllocation[msg.sender] += amount;
        walletBNBAllocation[msg.sender] += msg.value;

        // Update totalTokenSale and totalBNBValue
        totalTokenSale += amount;
        totalBNBValue += msg.value;

        // Send additional tokens to participant's wallet
        sendTokenToWallet(amount, msg.sender);
    }
}
```

Admin Access Control

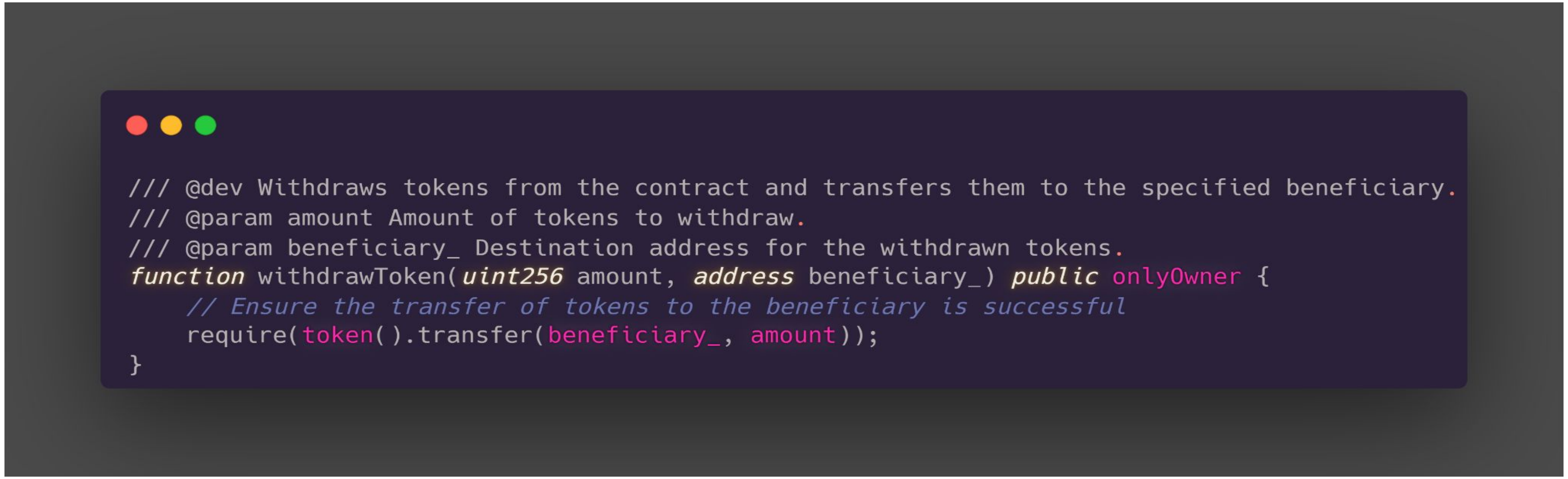
- ➔ The **modifier** checks if the caller is either the admin or the owner of the smart contract.
- ➔ If the condition is met, the function continues **execution**; otherwise, an **error** is thrown.



```
/// @dev Modifier to restrict function access to the admin or owner.
modifier onlyAdmin() {
    // Ensure the caller is either the admin or the owner
    require(msg.sender == admin || msg.sender == owner(), "Caller is neither admin nor
owner");// Continue with the function if the condition is met
}
```

Token Withdrawal Functionality

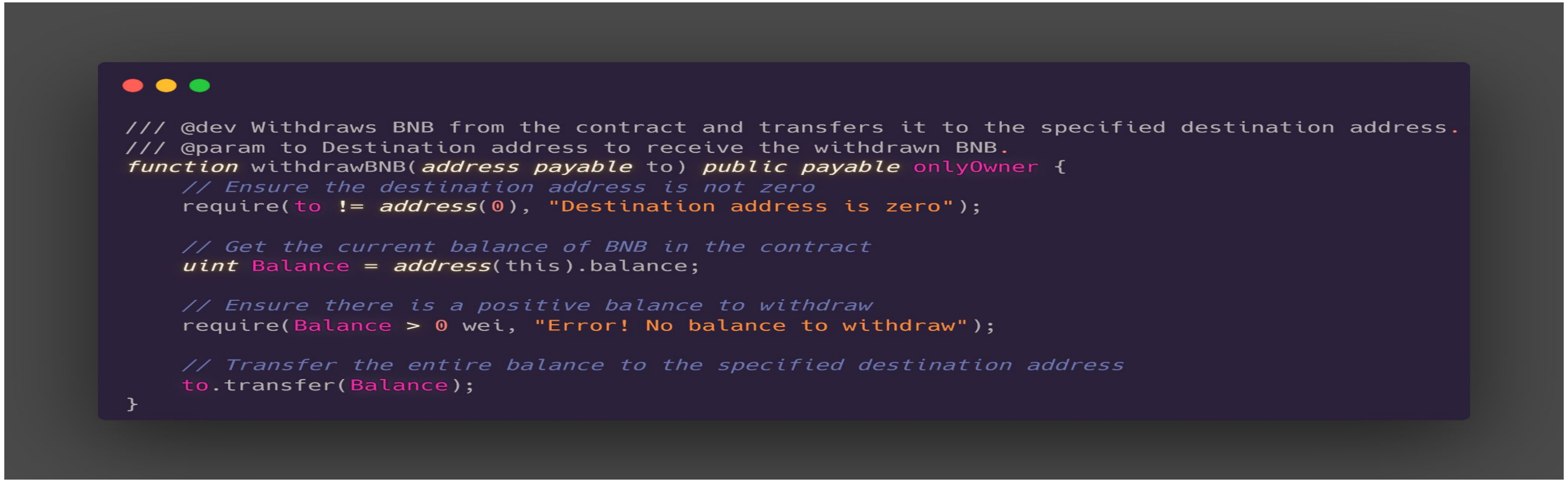
- ➔ The function takes two parameters: **amount** (the quantity of tokens to withdraw) and **beneficiary_** (the address to receive the withdrawn tokens).
- ➔ The withdrawal is contingent on the successful transfer of tokens to the specified beneficiary.



```
/// @dev Withdraws tokens from the contract and transfers them to the specified beneficiary.
/// @param amount Amount of tokens to withdraw.
/// @param beneficiary_ Destination address for the withdrawn tokens.
function withdrawToken(uint256 amount, address beneficiary_) public onlyOwner {
    // Ensure the transfer of tokens to the beneficiary is successful
    require(token().transfer(beneficiary_, amount));
}
```

BNB Withdrawal Functionality

- ➔ The function takes a parameter **to** (the address to receive the withdrawn BNB).
- ➔ It ensures that the destination address is valid and not zero.
- ➔ It checks that there is a positive BNB balance in the contract before initiating the transfer.



```
/// @dev Withdraws BNB from the contract and transfers it to the specified destination address.
/// @param to Destination address to receive the withdrawn BNB.
function withdrawBNB(address payable to) public payable onlyOwner {
    // Ensure the destination address is not zero
    require(to != address(0), "Destination address is zero");

    // Get the current balance of BNB in the contract
    uint Balance = address(this).balance;

    // Ensure there is a positive balance to withdraw
    require(Balance > 0 wei, "Error! No balance to withdraw");

    // Transfer the entire balance to the specified destination address
    to.transfer(Balance);
}
```

Conclusion and Q&A

Wrapping Up and Questions

Thank you!