Generating RSA PEM Key Pair using Go

A Step-by-Step Guide to Generate and Test RSA Key Pair in Go

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RSA is a widely used public-key cryptography algorithm that is used for secure communication over the internet. In this article, we will learn how to generate an RSA PEM key pair from pure Go code and how to test it.

To generate an RSA PEM key pair, we need to follow these steps:

1. Generate a new RSA private key.
2. Encode the private key to the PEM format.
3. Extract the public key from the private key.
4. Encode the public key to the PEM format.

Let's dive into the code to generate an RSA PEM key pair from pure Go:

```
package main

import (
    "crypto/rand"
    "crypto/rsa"
    "crypto/x509"
    "encoding/pem"
    "fmt"
    "os"
```

```
)

func main() {
    // Generate a new RSA private key with 2048 bits
    privateKey, err := rsa.GenerateKey(rand.Reader, 2048)
    if err != nil {
        fmt.Println("Error generating RSA private key:", err)
        os.Exit(1)
    }

    // Encode the private key to the PEM format
    privateKeyPEM := &pem.Block{
        Type:  "RSA PRIVATE KEY",
        Bytes: x509.MarshalPKCS1PrivateKey(privateKey),
    }
    privateKeyFile, err := os.Create("private_key.pem")
    if err != nil {
        fmt.Println("Error creating private key file:", err)
        os.Exit(1)
    }
    pem.Encode(privateKeyFile, privateKeyPEM)
    privateKeyFile.Close()

    // Extract the public key from the private key
    publicKey := &privateKey.PublicKey

    // Encode the public key to the PEM format
    publicKeyPEM := &pem.Block{
        Type:  "RSA PUBLIC KEY",
        Bytes: x509.MarshalPKCS1PublicKey(publicKey),
    }
    publicKeyFile, err := os.Create("public_key.pem")
    if err != nil {
        fmt.Println("Error creating public key file:", err)
        os.Exit(1)
    }
    pem.Encode(publicKeyFile, publicKeyPEM)
    publicKeyFile.Close()

    fmt.Println("RSA key pair generated successfully!")
}
```

In the above code, we first generate a new RSA private key with 2048 bits using the `rsa.GenerateKey` function. We then encode the private key to the PEM format using the `pem.Encode` function and write it to a file named `private_key.pem`.

Next, we extract the public key from the private key and encode it to the PEM format using the `pem.Encode` function. We write the public key to a file named `public_key.pem`.

Finally, we print a success message to the console.

To run this program, save the code to a file named `generate_rsa_key_pair.go`, and then run the following command in your terminal:

```
go run generate_rsa_key_pair.go
```

This will generate a private key file named `private_key.pem` and a public key file named `public_key.pem` in your current directory.

To test the generated RSA key pair, we can use the following steps:

1. Load the private key from the `private_key.pem` file.
2. Sign a message using the private key.
3. Load the public key from the `public_key.pem` file.
4. Verify the signature using the public key.

Here is the code to test the generated RSA key pair:

```
package main

import (
    "crypto"
    "crypto/rand"
    "crypto/rsa"
    "crypto/sha256"
    "crypto/x509"
    "encoding/pem"
    "fmt"
    "io/ioutil"
    "os"
)
```

```
func main() {
    // Load the private key from the file
    privateKeyFile, err := ioutil.ReadFile("private_key.pem")
    if err != nil {
        fmt.Println("Error loading private key file:", err)
        os.Exit(1)
    }
    privateKeyBlock, _ := pem.Decode(privateKeyFile)
    privateKey, err := x509.ParsePKCS1PrivateKey(privateKeyBlock.Bytes)
    if err != nil {
        fmt.Println("Error parsing private key:", err)
        os.Exit(1)
    }

    // Sign a message using the private key
    message := []byte("Hello, world!")
    hash := sha256.Sum256(message)
    signature, err := rsa.SignPKCS1v15(rand.Reader, privateKey, crypto.SHA256, has
    if err != nil {
        fmt.Println("Error signing message:", err)
        os.Exit(1)
    }

    // Load the public key from the file
    publicKeyFile, err := ioutil.ReadFile("public_key.pem")
    if err != nil {
        fmt.Println("Error loading public key file:", err)
        os.Exit(1)
    }
    publicKeyBlock, _ := pem.Decode(publicKeyFile)
    publicKey, err := x509.ParsePKCS1PublicKey(publicKeyBlock.Bytes)
    if err != nil {
        fmt.Println("Error parsing public key:", err)
        os.Exit(1)
    }

    // Verify the signature using the public key
    hash = sha256.Sum256(message)
    err = rsa.VerifyPKCS1v15(publicKey, crypto.SHA256, hash[:], signature)
    if err != nil {
        fmt.Println("Error verifying signature:", err)
        os.Exit(1)
    }

    fmt.Println("RSA key pair tested successfully!")
}
```

In the above code, we first load the private key from the `private_key.pem` file and parse it using the `x509.ParsePKCS1PrivateKey` function. We then sign a message using the private key and the `rsa.SignPKCS1v15` function.

Next, we load the public key from the `public_key.pem` file and parse it using the `x509.ParsePKCS1PublicKey` function. We verify the signature using the public key and the `rsa.VerifyPKCS1v15` function.

Finally, we print a success message to the console.

To test this program, save the code to a file named `test_rsa_key_pair.go`, and then run the following command in your terminal:

```
go run test_rsa_key_pair.go
```

This will load the RSA key pair from the `private_key.pem` and `public_key.pem` files, sign

In conclusion, generating an RSA PEM key pair from pure Go code is a straightforward process that can be accomplished with just a few lines of code. With the generated key pair, you can use it to encrypt and decrypt data, sign and verify messages, and establish secure communication channels over the internet.

Code — https://github.com/rtiwariops/CodeHub/tree/main/rsa-pem-key-pair

Go Golang Keypair Rsa Pem

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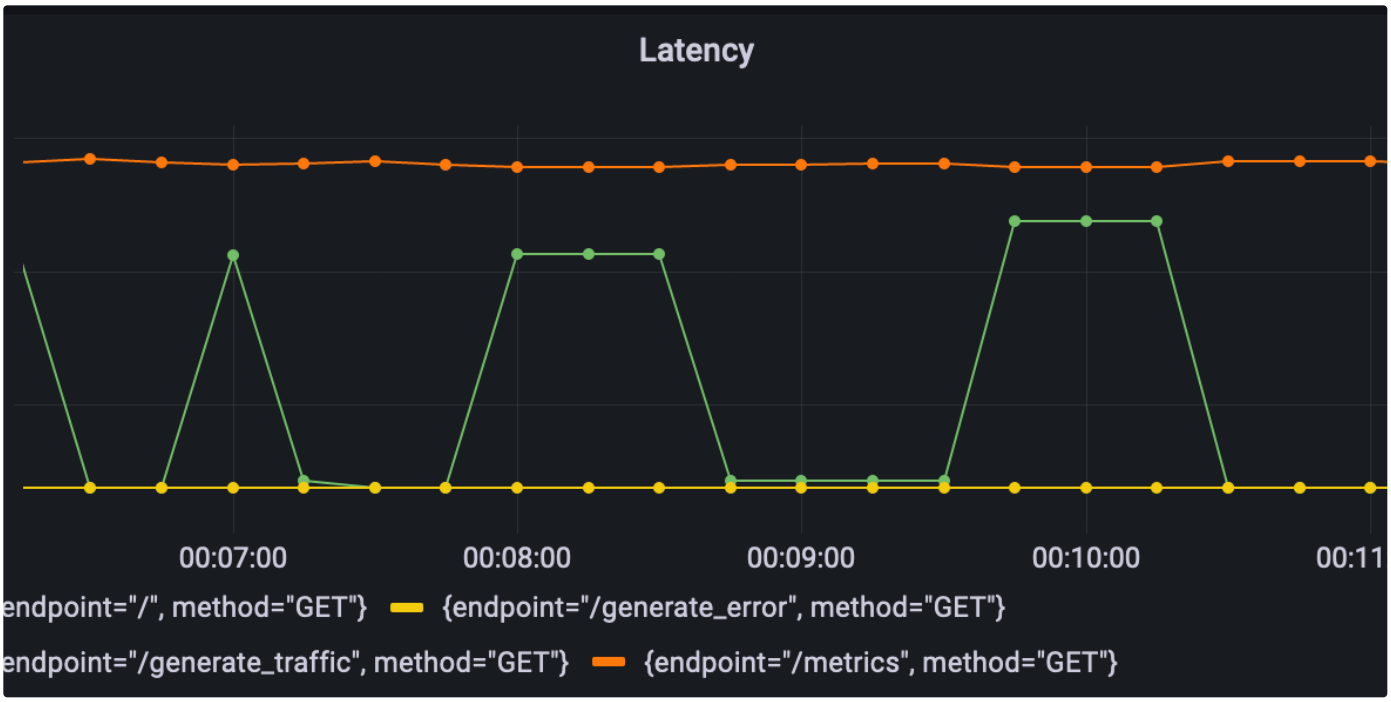

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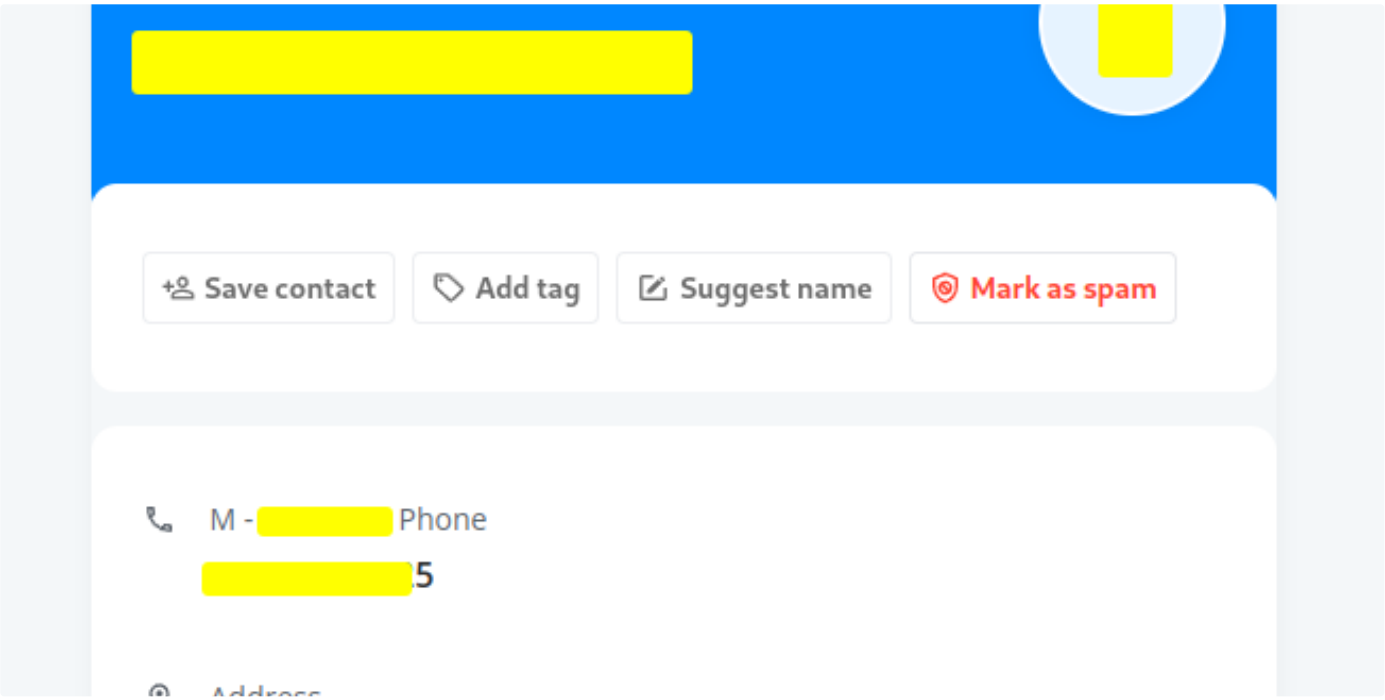

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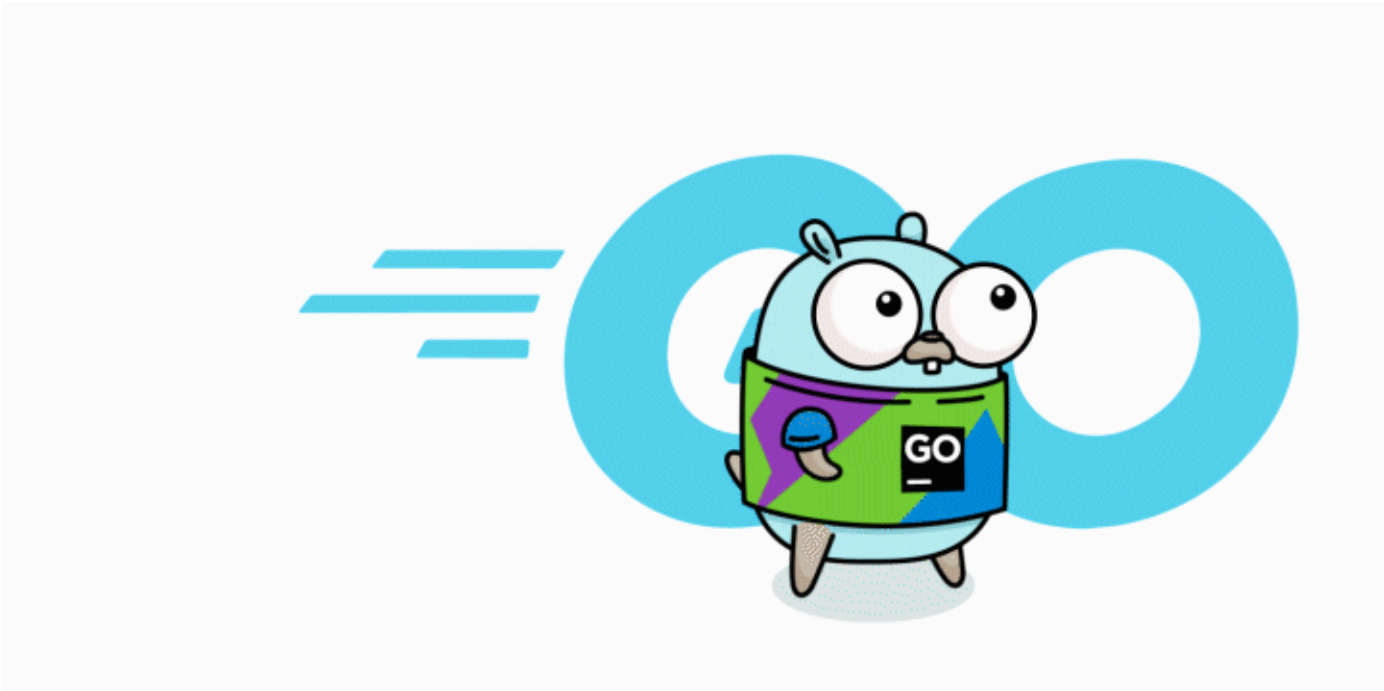

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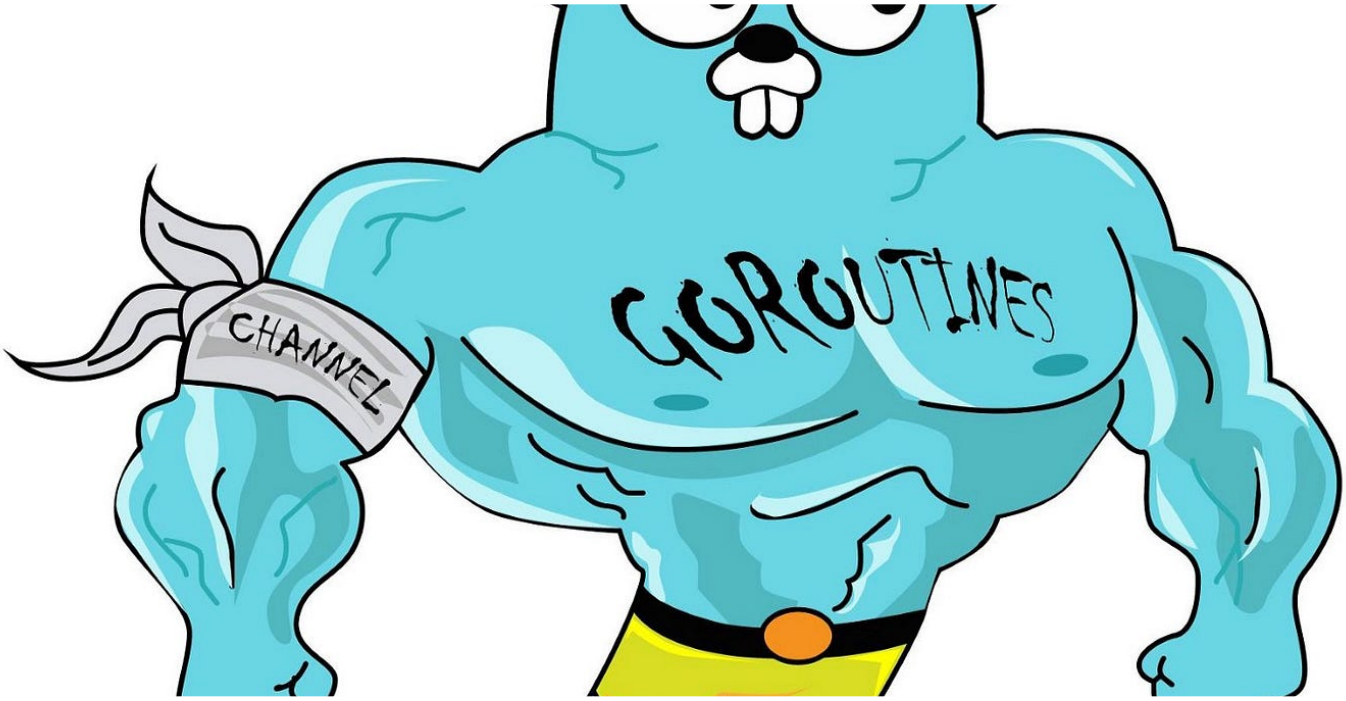

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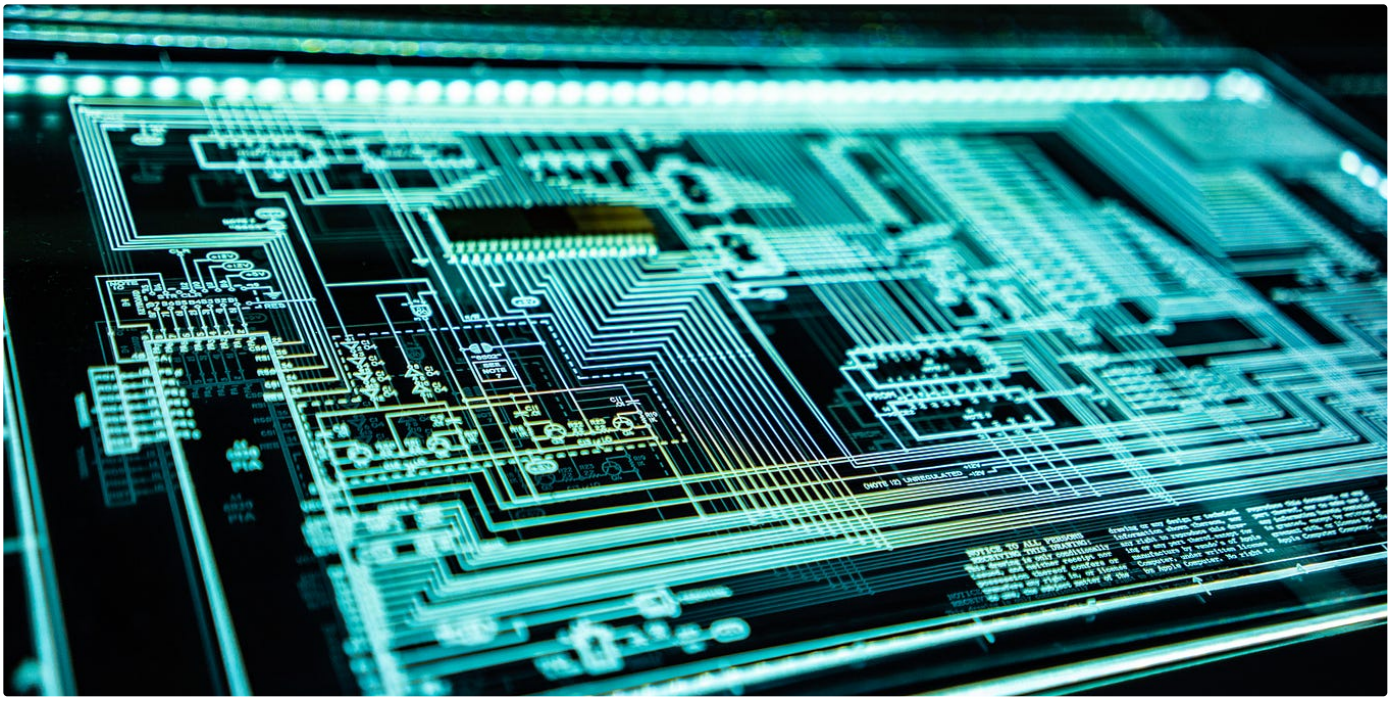

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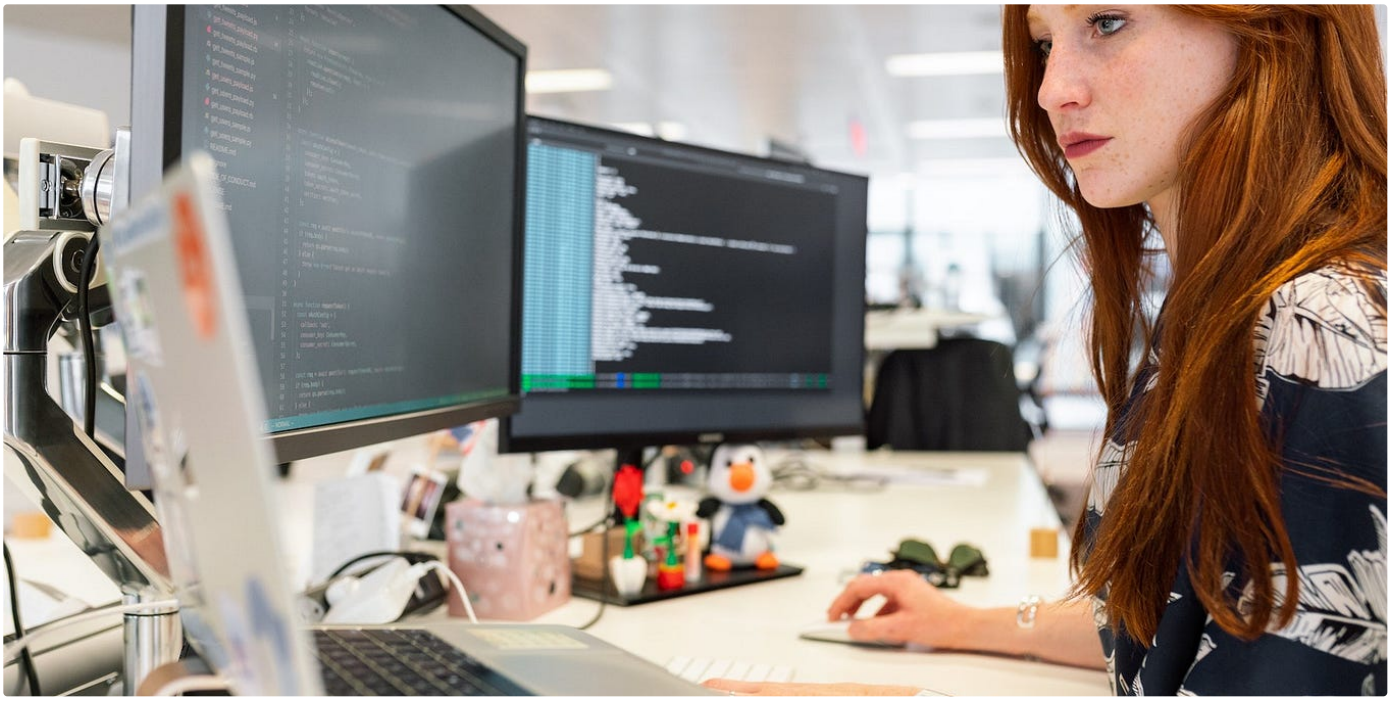

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