Lab Exercise 4- Signed Commits in Git and GitHub

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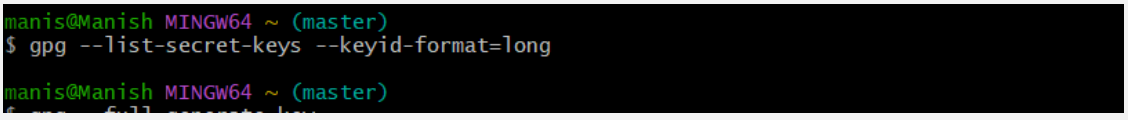
Prerequisites:

- Git installed on your system
- GPG (GNU Privacy Guard) installed and configured
- GitHub account with a repository (you own or have write access to)
- Basic knowledge of Git commands

Step 1 – Generate or Use an Existing GPG Key

1. **Check for existing keys**

```
gpg --list-secret-keys --keyid-format=long
```



2. **If no key exists, generate a new one**

gpg --full-generate-key

```
manis@Manish MINGW64 ~ (master)
$ gpg --full-generate-key
gpg (GnuPG) 2.4.7-unknown; Copyright (C) 2024 g10 Code GmbH
This is free software: you are free to change and redistribute it.
There is NO WARRANTY, to the extent permitted by law.

Please select what kind of key you want:
   (1) RSA and RSA
   (2) DSA and Elgamal
   (3) DSA (sign only)
   (4) RSA (sign only)
   (9) ECC (sign and encrypt) *default*
  (10) ECC (sign only)
  (14) Existing key from card
Your selection? 1
RSA keys may be between 1024 and 4096 bits long.
What keysize do you want? (3072) 4096
Requested keysize is 4096 bits
Please specify how long the key should be valid.
         0 = key does not expire
      <n>  = key expires in n days
      <n>w = key expires in n weeks
      <n>m = key expires in n months
      <n>y = key expires in n years
Key is valid for? (0) 0
Key does not expire at all
Is this correct? (y/N) y

GnuPG needs to construct a user ID to identify your key.

Real name: manish133144
Email address: manishkumar133144@gmail.com
Comment: for generating key
You selected this USER-ID:
    "manish133144 (for generating key) <manishkumar133144@gmail.com>"

Change (N)ame, (C)omment, (E)mail or (O)kay/(Q)uit? (O)uit
Change (N)ame, (C)omment, (E)mail or (O)kay/(Q)uit? (O)
Change (N)ame, (C)omment, (E)mail or (O)kay/(Q)uit? O
We need to generate a lot of random bytes. It is a good idea to perform
some other action (type on the keyboard, move the mouse, utilize the
disks) during the prime generation; this gives the random number
generator a better chance to gain enough entropy.
manish133144We need to generate a lot of random bytes. It is a good idea to perform
some other action (type on the keyboard, move the mouse, utilize the
disks) during the prime generation; this gives the random number
generator a better chance to gain enough entropy.
```

- Select **RSA and RSA**
- Key size: **4096**
- Expiration: **0** (never) or a fixed date

- Enter your **GitHub-registered name and email**

3. **Get your key ID**

```
gpg --list-secret-keys --keyid-format=long
```

```
manis@Manish MINGW64 ~ (master)
$ gpg --list-secret-keys --keyid-format=long
gpg: checking the trustdb
gpg: marginals needed: 3  completes needed: 1  trust model: pgp
gpg: depth: 0  valid:   1  signed:   0  trust: 0-, 0q, 0n, 0m, 0f, 1u
[keyboxd]
---------
sec   rsa4096/67FCFD6BE34A25B6 2025-09-07 [SC]
      2433540A387BCE8FA20BBE2E67FCFD6BE34A25B6
uid                 [ultimate] manish133144 (for generating key) <manishkumar133144@gmail.com>
ssb   rsa4096/912C2817DD8D68CC 2025-09-07 [E]
```

Example output:

```
sec   rsa4096/3AA5C34371567BD2 2025-08-13 [SC]
```

Here, 3AA5C34371567BD2 is your key ID.

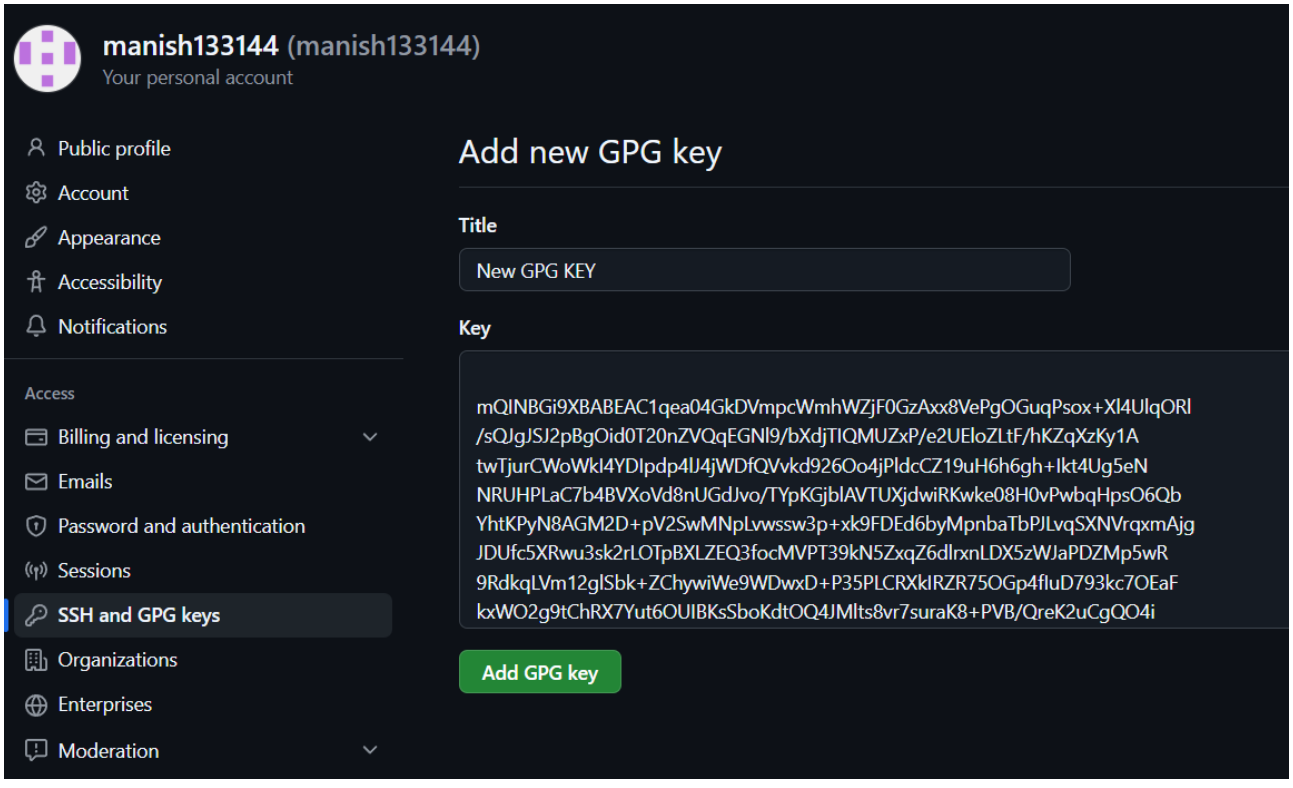
Step 2 – Add GPG Key to GitHub

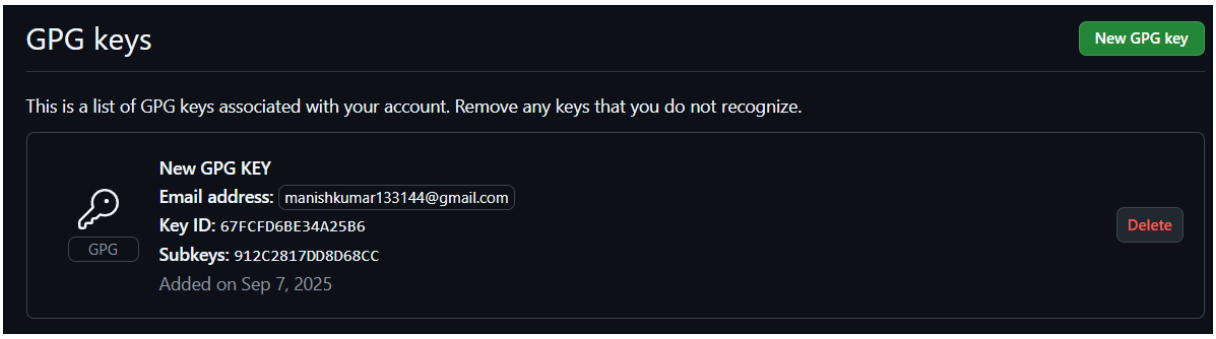
1. Export your public key:

```
manis@Manish MINGW64 ~ (master)
$ gpg --armor --export 67FCFD6BE34A25B6

-----BEGIN PGP PUBLIC KEY BLOCK-----

mQINBGi9XBABEAC1qea04GkDVmpcWmhWZjF0GzAxx8VePgOGuqPsox+Xl4UlqORl
/sQJgJSJ2pBgOid0T20nZVQqEGNl9/bXdjTIQMUZxP/e2UEloZLtF/hKZqXzKy1A
twTjurCWoWkI4YDIpdp4lJ4jWDfQVvkd926Oo4jPldcCZ19uH6h6gh+Ikt4Ug5eN
NRUHPLaC7b4BVXoVd8nUGdJvo/TYpKGjblAVTUXjdwiRKwke08H0vPwbqHpsO6Qb
YhtKPyN8AGM2D+pV2SwMNpLvwssw3p+xk9FDEd6byMpnbaTbPJLvqSXNVrqxmAjg
JDUfc5XRwu3sk2rLOTpBXLZEQ3focMVPT39kN5ZxqZ6dlrxnLDX5zWJaPDZMp5wR
9RdkqLVm12glSbk+ZChywiWe9WDwxD+P35PLCRXkIRZR75OGp4fIuD793kc7OEaF
kxWO2g9tChRX7Yut6OUIBKsSboKdtOQ4JMlts8vr7suraK8+PVB/QreK2uCgQO4i
RDBeEtB6AEZKdwjqZppG13bwMyNPf7cF6XXL/rbj/dNfKYjsFfKWlGbnRXd1+oYm
w1S+fP9RWT/Kn5IRx+iLK2GfNDAaTLsDzy7AT/sM2jsxipybPCobldSjoIYSexRs
GjSDNkkZZtMUoT3xk5y8tGmU47qGxGznBUZMgL1NHQhwsRQVVQg7N+nHWwARAQAB
tD9tYW5pc2gxMzMxNDQgKGZvciBnZW5lcmF0aW5nIGtleSkgPG1hbmlzaGt1bWFy
MTMzMTQOQGdtYWlsLmNvbT6JAlEEEwEIADsWIQQkM1QKOHvOj6ILvi5n/P1r4Ool
tgUCaL1cEAIbAwULCQgHAgIiAgYVCgkICwIEFgIDAQIeBwIXgAAKCRBn/P1r4Ool
tpdOEACOxMLNHhclYepThNgFJPaGrZDASYYbdkJ+PLPua7KgGiMBlDTFGCzaTmKv
zSGXmcD9fdwYIBAT0VlJOoVV+4NQiI/8nZKuoOoOD8jTJGi3VnXljr3l23eci/vO
js+Hv5Pjtge8Amom5Gi8d1QltLBlw5Kw2YN5N6MEiWDZ7sMDhLNH5K6yE5v1ZAT0
zBWoE+JlXU+PdfHm5OoRwlQeHU715JvtPIkE0YKcmbr3D+WuzBqtr6eGY3iir7Cb
HJmL6K/Q86wMwW21QphU79+w9OZndJkVSwwNIhHPNscIrzSlluTPbztRepDwekaj
H1fMhdtXhTh6AniRWUHQlQRM2WKgif1RFTdqjsFis7Rtf0q/NBj+sKBGPKd6UB/8
WTywkMoVnkG+jEp/J3z51WRAogdBOA1yIiULJPQAsYZ/tASbMNqw3UdAEg/ko1Dm
HRXIWfXqrie65EuK3jZTNB+nmG9SLlGQOxIfHfM2oMrTrbkoItAHfJzRAtJtgaxh
```

2. Copy the output.

3. Go to **GitHub → Settings → SSH and GPG Keys → New GPG Key**.





Step 3 – Configure Git for Signed Commits

1. Tell Git which key to use:

```
git config --global user.signingkey YOUR_KEY_ID
```

```
manis@Manish MINGW64 ~ (master)
$ git config --global user.signingkey 67FCFD6BE34A25B6
```

2. Enable signing for all commits:

```
git config --global commit.gpgsign true
```

```
manis@Manish MINGW64 ~ (master)
$ git config --global commit.gpgsign true
```

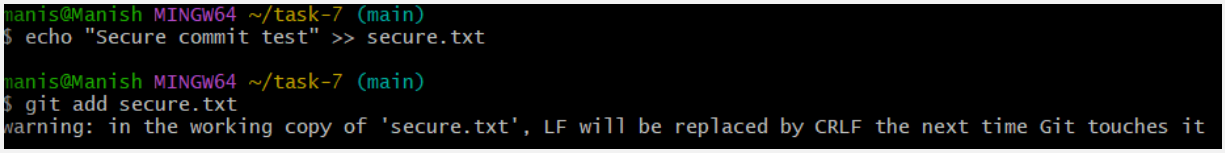
Step 4 – Make a Signed Commit

1. Clone your repo (or use an existing one):

```
git clone https://github.com/<username>/<repository>.git

cd <repository>
```

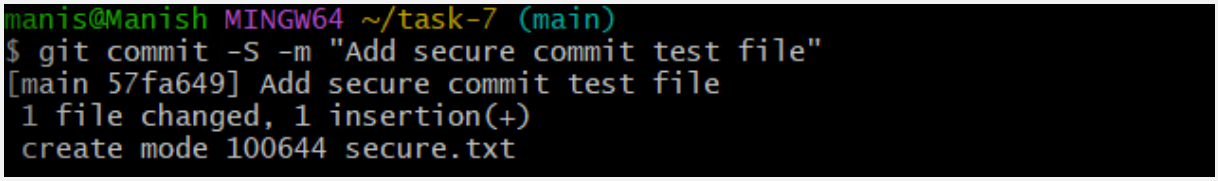
2. Edit or create a file:

```
echo "Secure commit test" >> secure.txt

git add secure.txt
```

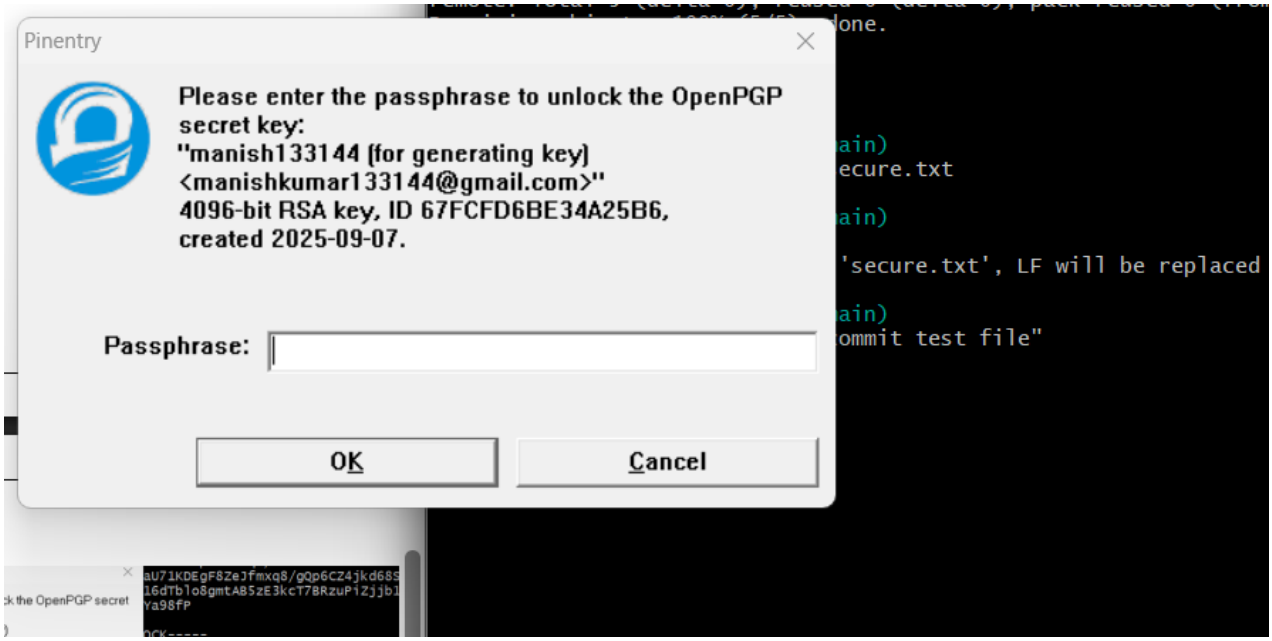


3. Commit with signing:

```
git commit -S -m "Add secure commit test file"
```



4. Enter your GPG passphrase when prompted.



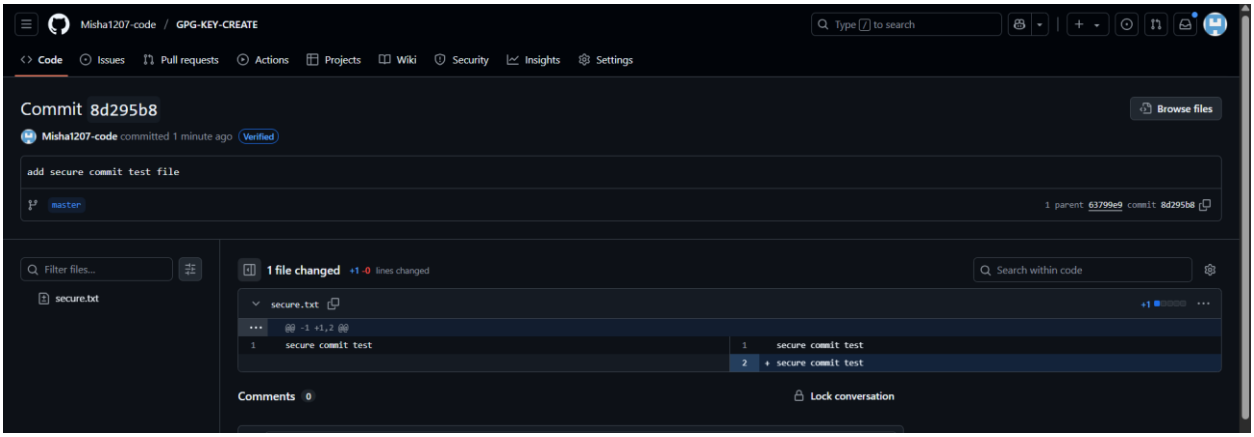
Step 5 – Push and Verify on GitHub

1. Push the commit:

git push origin main

```
manis@Manish MINGW64 ~/task-7 (main)
$ git push origin main
Enumerating objects: 4, done.
Counting objects: 100% (4/4), done.
Delta compression using up to 12 threads
Compressing objects: 100% (2/2), done.
Writing objects: 100% (3/3), 984 bytes | 492.00 KiB/s, done.
Total 3 (delta 0), reused 0 (delta 0), pack-reused 0 (from 0)
To https://github.com/manish133144/task-7.git
   93f2cee..57fa649  main -> main
```

2. Go to your repository on GitHub → Click the commit → You should see a **green "Verified" badge.**



Step 6 – Local Verification of Commit

git log --show-signature

```
manis@Manish MINGW64 ~/task-7 (main)
$ git log --show-signature
commit 57fa64940c3b20a3aa12fa5e9953588f91de46fa (HEAD -> main, origin/main, origin/HEAD)
gpg: Signature made Sun Sep  7 16:28:18 2025 IST
gpg:                using RSA key 2433540A387BCE8FA20BBE2E67FCFD6BE34A25B6
gpg: Good signature from "manish133144 (for generating key) <manishkumar133144@gmail.com>" [ultimate]
Author: manish133144 <manishkumar133144@gmail.com>
Date:   Sun Sep 7 16:28:18 2025 +0530
```

This will display the GPG verification details locally.
