

Today's Agenda

- ▶ Review
 - ▶ Asymmetric Key basics
 - ▶ GPG basic commands
- ▶ Key signing party assignment due next Tuesday @ 11:59pm
 - ▶ Sign 3 other student keys
 - ▶ Get your key signed by three others

Key Signing Party!!

- ▶ 3 GRADED Assignments for today
 - ▶ Mkijowski signed public key (pilot dropbox)
 - ▶ YOUR thrice-signed public key (pilot dropbox)
 - ▶ Sign three other students keys (pilot dropbox)

It's going to be a lame party isn't it. . .

You all should have run the following and uploaded it to pilot:

```
gpg --full-generate-key
```

- ▶ Use your real name and campus email!
- ▶ Use all the bits (4096)!
- ▶ Feel free to set an expiration of 16w (weeks) if you plan on throwing this away ***AT THE END OF THIS SEMESTER***
- ▶ Use a password that you will not forget!
- ▶ We will use this key again so make sure you save it!

Goals for today

- ▶ Establish trust with instructor (and 3 other students in this class)
- ▶ Import the public key ring for this class
- ▶ Sign and Return my public key
- ▶ Sign 3 other keys and upload
- ▶ Get your key signed by three others

Import my public key

- ▶ Attempt 1: `gpg --recv-keys
E47763416159625F60ACE88A7E5CF54E1BBA3984`
- ▶ Attempt 2: `gpg --keyserver keyserver.ubuntu.com
--recv-keys
E47763416159625F60ACE88A7E5CF54E1BBA3984`

OR

Copy and paste the contents (from `kijowski-gpg/`) into a file in linux and import it with:

- ▶ `gpg --import kijowski.gpg`
- ▶ OR: `gpg --import kijowski.gpg.pub.txt`

Check fingerprint, sign my key

```
E477 6341 6159 625F 60AC  E88A 7E5C F54E 1BBA 3984 <- Look  
                                7E5C F54E 1BBA 3984 <- This
```

- ▶ `gpg --list-key matthew.kijowski@wright.edu`
- ▶ `gpg --edit-key matthew.kijowski@wright.edu`
- ▶ `sign`
- ▶ `save`
- ▶ `gpg --armor --export matthew.kijowski@wright.edu`

Return this key to me via pilot dropbox AS A PLAIN TEXT FILE!

Lets refresh hashing and Asymmetric encryption

A hash gaurantees integrity (message has not changed).

Public key can decrypt messages from private. (Authenticity)

Private key can decrypt messages from public. (Confidentiality)

Lets party!

- ▶ Convince your table mates that you are the person with the given email and share your fingerprint!
- ▶ Exchange public keys (send/recv or just export and email/discord)
 - ▶ `gpg --armor --export YOUR.email@wright.edu`
- ▶ Import `gpg --import their-filename` OR `gpg --recv-keys`
- ▶ Sign `gpg --edit-key THEIR.email@wright.edu > sign > save`
- ▶ Return signed key to them reverse of above exchange
 - ▶ `gpg --armor --export THEIR.email@wright.edu`
- ▶ Import your new signatures `gpg --import filename`

Among your table (and Discord)

- ▶ Download/copy/paste each person's public key from discord
- ▶ Make a file in your home directory for each key
- ▶ Files should start with -----BEGIN PGP PUBLIC KEY
BLOCK-----
- ▶ Import with the following

```
gpg import <filename>
```

Day 2 (what are we even doing?)

- ▶ Exchanging keys
- ▶ Establishing a Web of Trust!

But what else can we be doing...

- ▶ `gpg --list-sigs <Email or Fingerprint>`

Signed sealed delivered

Lets sign a message!

- ▶ Create a `sample.txt` file with a public message (Hello World or some such thing).
- ▶ `gpg --sign sample.txt`
- ▶ share the output `sample.gpg` with someone you exchanged keys with
- ▶ cat the output file, can you read the contents?
- ▶ `gpg --verify sample.gpg`

Other signing options

- ▶ `gpg --clear-sign`
- ▶ `gpg --detach-sign`

Now for some fun

Lets send a secret message!

- ▶ Create a text file `secret-message.txt`
- ▶ Choose someone you have exchanged keys with
- ▶ Encrypt the file: `gpg --output secret-message.gpg --encrypt --recipient their.email@wright.edu`
- ▶ Send them `secret-message.txt` via email or discord
- ▶ The recipient can decrypt with:
 - ▶ `gpg --output secret.txt --decrypt secret-message.gpg`

Back up your gpg keys!!!

```
tar -cpzf gnupg.tar.gz ~/.gnupg/
```

if you are using a Wright State laptop

```
cp gnupg.tar.gz /mnt/c/Users/student/Desktop/
```

Save this file!!!

You can also backup your private key and any public keys with:

- ▶ `gpg --armor --export-secret-key
your.email@wright.edu > mysecretkey.gpg`
- ▶ `gpg --armor --export > allpubkeys.gpg`

(Web of Trust)[https://en.wikipedia.org/wiki/Web_of_trust]

Decentralized trust network similar to what we have done in class.

- ▶ Hard to attack
- ▶ easy to lose private key
- ▶ hard to get started as a new user (how do you gain trust?)

Wouldn't it be nice

- ▶ Lets pretend we are lazy. . .
- ▶ How would you improve the Web of Trust?

I really hope we invented a Certificate Authority. . .

Raise your hand if you know the following companies

- ▶ Thawte
- ▶ Comodo
- ▶ WoSign
- ▶ Symantec
- ▶ GoDaddy

(Timeline of Certificate Authority Failures)[https://sslmate.com/resources/certificate_authority_failures]

PKI

The methods, policies, roles, hardware, software, and procedures that facilitate creating, managing, distributing, using, storing, and revoking public keys is called a Public Key Infrastructure (PKI).