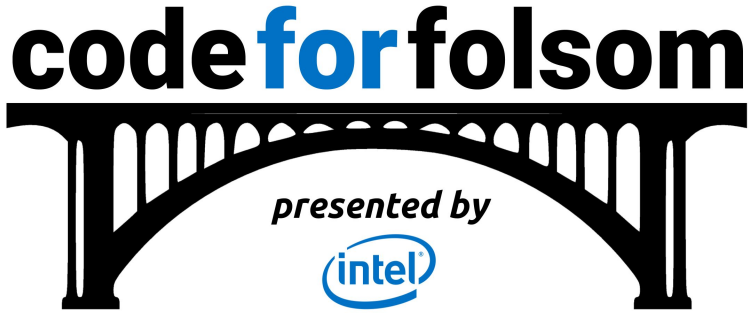



# Encryption

Session 4

*A cybersecurity boot camp organized by* YELLOW CIRCLE

# Introductions

## Instructors

- Name
- Job / Company
- Industry Experience
- Something interesting

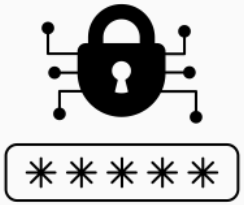
## Volunteers

- Name
- Job / School
- Something interesting

# Session Overview

## Encryption

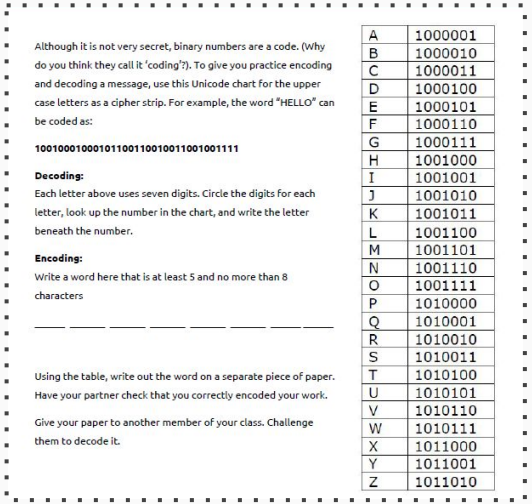
- What is encryption?
- Why do we need encryption?
- When is data encrypted?
- How is it encrypted?
- Encoded vs Decoded



# Student Activity

## Simple encryption with Binary

- Pass binary encryption worksheets
- Create a secret word using binary
- Pass the sheet to someone else
- Time to decrypt the word
- Use table to decrypt
- Keep your words respectable



Although it is not very secret, binary numbers are a code. (Why do you think they call it 'coding'?). To give you practice encoding and decoding a message, use this Unicode chart for the upper case letters as a cipher strip. For example, the word "HELLO" can be coded as:

**1001000100010110011001001100100111**

**Decoding:**
Each letter above uses seven digits. Circle the digits for each letter, look up the number in the chart, and write the letter beneath the number.

**Encoding:**
Write a word here that is at least 5 and no more than 8 characters

____ ____ ____ ____ ____ ____ ____ ____

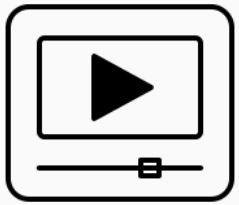
Using the table, write out the word on a separate piece of paper. Have your partner check that you correctly encoded your work.

Give your paper to another member of your class. Challenge them to decode it.

| | |
|---|---|
| A | 1000001 |
| B | 1000010 |
| C | 1000011 |
| D | 1000100 |
| E | 1000101 |
| F | 1000110 |
| G | 1000111 |
| H | 1001000 |
| I | 1001001 |
| J | 1001010 |
| K | 1001011 |
| L | 1001100 |
| M | 1001101 |
| N | 1001110 |
| O | 1001111 |
| P | 1010000 |
| Q | 1010001 |
| R | 1010010 |
| S | 1010011 |
| T | 1010100 |
| U | 1010101 |
| V | 1010110 |
| W | 1010111 |
| X | 1011000 |
| Y | 1011001 |
| Z | 1011010 |

## Encryption as Fast As Possible

- Discuss: Codes (ciphers) are used to keep messages secret
- Lets watch it:
  - *https://www.youtube.com/watch?v=dut9EnbFym0*
  - *Teacher materials: video-4.1*
- Discuss with students



# Student Activity

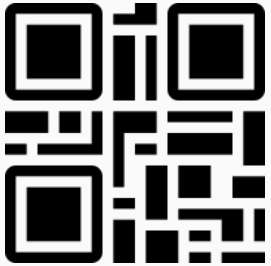
## Secret Messages

- Messages are encrypted using a key
- Key is needed to read the message
- https://codemoji.org

# Types of Encryption

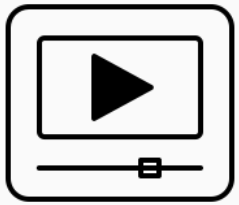
## Different ways

- Goal is to go from plaintext to ciphertext
- Encryption algorithms
- Encryption keys
- Symmetric Encryption
- Asymmetric Encryption

## Symmetric Key and Public Key Encryption

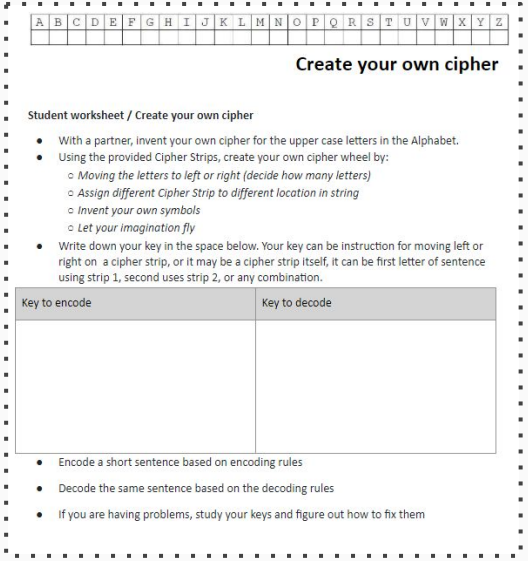
- Different forms of Encryption
- Lets watch it:
  - *https://www.youtube.com/watch?v=ERp8420ucGs*
  - *Teacher materials: video-4.2*



# Student Activity

## Cipher Strips

- Pass cipher strips sheets / worksheet
- Creating keys by moving characters
- Make a harder key
- Write down key method
- Encrypt a simple sentence



A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

**Create your own cipher**

**Student worksheet / Create your own cipher**

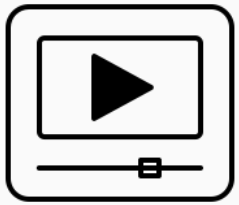
- With a partner, invent your own cipher for the upper case letters in the Alphabet.
- Using the provided Cipher Strips, create your own cipher wheel by:
  - *Moving the letters to left or right (decide how many letters)*
  - *Assign different Cipher Strip to different location in string*
  - *Invent your own symbols*
  - *Let your imagination fly*
- Write down your key in the space below. Your key can be instruction for moving left or right on a cipher strip, or it may be a cipher strip itself, it can be first letter of sentence using strip 1, second uses strip 2, or any combination.

| Key to encode | Key to decode |
|---|---|
| | |

- Encode a short sentence based on encoding rules
- Decode the same sentence based on the decoding rules
- If you are having problems, study your keys and figure out how to fix them

## What is Public Key Infrastructure (PKI)

- How PKI works to securely send and receive messages
- Lets watch it:
  - *https://www.youtube.com/watch?v=i-rtxrEz_E8*
  - *Teacher materials: video-4.2*



## Public Key / Private Key Demo

- Public key to encrypt
- Private key to decrypt

# Public Key / Private Key

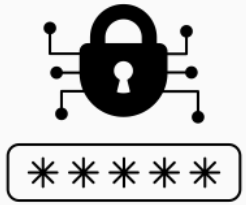
## Modern Encryption

- Using PKI
- How are keys exchanged
- Private key to decrypt
- Public key to encrypt

# Closing / Wrap-up

## What we learned...

- Encryption / Decryption
- Ciphers / Codes / Keys
- Protecting data / documents



# Session Feedback

## How are we doing?

- Pass survey sheet
- Students:
  - Fill in Session #
  - Fill in Room #
  - Answer questions
- Volunteers to collect surveys

# What's next...

## This is end of session 4

- This is end of day one of boot camp
- Don't forget to bring:
  - Backpack
  - Badge / Name Tag
  - Raffle Tickets
- Meet in Cafeteria at 8:30 am tomorrow
- Prizes, giveaways : tomorrow at 3:15pm