Intro to Computer Science & Programming *for Adults*

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Welcome Back!

Computers are amazing...

... and sometimes scary?

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Week 1 – Intro to Computers & Computational Thinking

1. Hardware
2. Operating Systems
3. File Systems
4. Open House [Activity]
5. Break
6. Software, Binary Numbers, and Encapsulation [Demo]
7. An introduction to writing code (*pickcode.io*)
8. "I want the computer to talk to me." `print()`
9. "I want to talk to the computer." `s = input()`

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Week 2 – The Internet, Webpages, & Cybersecurity

1. How the Internet Works
2. How web pages work
3. Cybersecurity: Threat models, vectors, backups
4. "Have I Been Pwned?" [Activity]
5. Password Managers [Demo]
6. Break
7. Programming: Random numbers (*pickcode.io*)
8. Making decisions: `if-else`
9. Programming assignments: Magic 8 Ball, Guess A Number

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Week 3 – AI, Machine Learning, & Classifiers

1. What even *is* AI anyway?
2. Machine Learning
3. Large Language Models (LLMs)
4. Classifiers [Activity]
5. Break
6. Programming: loops (*pickcode.io*)
7. infinite loops
8. Number Guessing Game

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Week 4 – ?

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What is the Internet?

A series of connections (wired, wireless) and communication protocols that allow communicating devices to interact with each other.

Things that use or travel on the internet:
- World Wide Web traffic
- Email
- Transferring files (including streaming entertainment media)
- Controlling other computers
- Real-time communication: voice and video calling, online gaming

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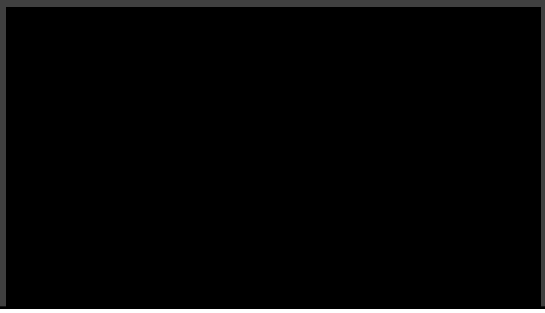
How does surfing work?



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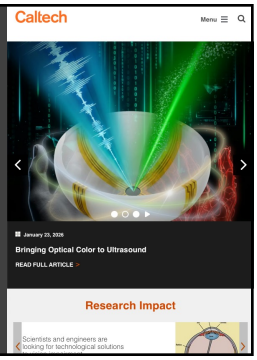
How web pages work

A webpage is a text file with
a. Content (Text, images)
b. Information on how to display that content (HTML, CSS)

A webpage, once written, can be uploaded to a server where it can be delivered to anyone who requests that page.

You can write a webpage without having a server, and you can view it on your computer without using the Internet.



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Write a web page (Future activity?)

1. Download template from website
2. Import it into pickcode.io
3. Modify content to your liking
4. Export it from pickcode.io (to use on your own computer)

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Data security – Backups

Everybody has data, and everybody has had data lost or compromised. An important way of mitigating data loss is having *backups* of that data.

"3-2-1 Backup Strategy":
- Three copies of your data
- ... on two different types of media
- ... with one copy "off site" (perhaps "in the cloud")

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Data security [Demo]

- Three copies of your data
  The original data counts as one!
- ... on two different types of media
  Backup at home on an external hard drive?
- ... with one copy "off site" (perhaps "in the cloud")
  Backblaze.com, or a second external hard drive at work

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Cybersecurity – Threat models

What is your "threat model?" What are the reasonable threats to you and/or your data that you might consider?

- Are you *a government official*?
- Are you a *celebrity*?
- Are you being *targeted* by a nation state?
- Are you being actively phished by scammers?

As we discuss data and threats here, it's important to keep a sense of perspective. For most people, some degree of reasonable caution is certainly warranted.

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Cybersecurity – Vectors

How do the *bad guys* get you? What can they do?

Phisher

Spoofs websites to steal login credentials, credit card numbers, bank accounts.

"Your account has been suspended. Click here to reactivate."

Fake Antivirus Operator

Creates fake antivirus software, tricks you into paying for it.

"Your system is infected!"

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Cybersecurity – Vectors

How do the *bad guys* get you? What can they do?

Spammer

Distributes spam emails, has you click links to buy unneeded items.

Malvertiser

Ads that lead to sites that host malware or ask for personal information.

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Cybersecurity – Email

From: rwhite@polytechnic.org
Date: October 18, 2018 at 10:42 PM
Subject: rwhite@polytechnic.org is hacked
To: myscb750f rwhite@polytechnic.org

Hello! My nickname in darknet is zippy10.

I hacked this mailbox more than six months ago, through it I infected your operating system with a virus (trojan) created by me and have been monitoring you for a long time.

So, your password from rwhite@polytechnic.org is myscb750f

Even if you changed the password after that - it does not matter, my virus intercepted all the caching data on your computer and automatically saved access for me. I have access to all your accounts, social networks, email

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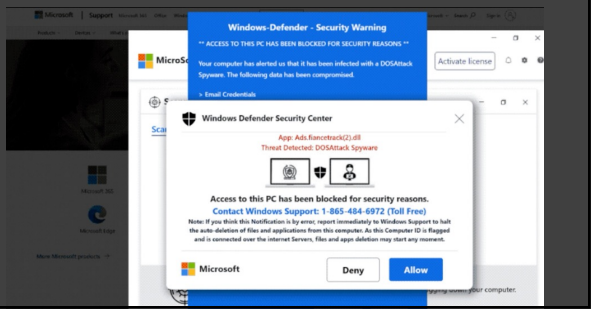
Cybersecurity – Webpages



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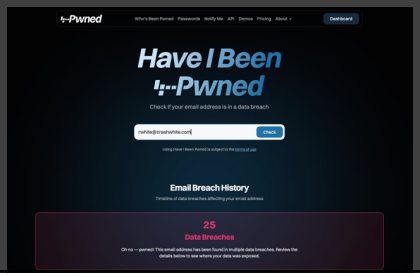
Data security [Activity]

Have I Been Pwned ("Owned")? https://haveibeenpwned.com



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Password Security

- Passwords
- Two-Factor Authentication (2FA)
- Password Apps (Apple *Password*, Google *Password Manager*)
- Password Managers: Bitwarden, 1Password, etc.

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Passwords – How do they work?

Irresponsible businesses store your password in *plaintext*.

When the website gets hacked, your email, username, and password are available for the hackers and others to see.

Responsible organizations store your password as a *hash*, a one-way obfuscation of the actual password. Even the organization doesn't know what your password is!

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Passwords [Demo]

- Password → `batman`
- Hashed password:

```
1532e76dbe9d43d0dea98c331ca5ae8a65c5e8e8b99d3e2a42ae989356f6242a
```

- Database:

```
rwhite@crashwhite.com        | batman

rwhite@crashwhite.com        |
1532e76dbe9d43d0dea98c331ca5ae8a65c5e8e8b99d3e2a42ae989356f6242a
```

- Rainbow table

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Password Manager [Demo]

1. Online service for which you have one, strong, password that protects all of your other userIDs & passwords.
   (This is important because passwords that have been exposed in a breach, and that you've reused on other sites make your data vulnerable on those other sites.)
2. "Doesn't that make *more* vulnerable? How can I trust this service?"
   Good questions! There is a "threat model" conversation to have here.
3. What happens if I'm not online? How can I get my passwords?
   If you're not online you don't need your password manager anyway. :) But you can keep a separate copy of all your passwords printed out or on your computer if you wish.

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Break

Back in 10 minutes?

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Programming Review

We worked with output and input statements last week, and finished up `mad_libs.py` .

We've also identified ways of interacting with numbers.

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Programming Review

```
age = 13
age = age + 1           # adds 1 to age and saves it
print(age)

inches = float(input("Enter a length in inches: "))
feet = int(inches / 12)             # This is new!
leftover_inches = inches % 12       # This is new!
print("The length", inches, "is actually")
print(feet, "feet and", leftover_inches, "inches")
```

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Comparing values

To compare numbers or string you can use the following comparison operations:

```
if value1 < value2:
if value1 > value2:
if value1 == value2:
if value1 <= value2:
if value1 >= value2:
if value1 != value:
```

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`if-else` statements

We need our programs to make decisions, to act differently depending on circumstances. We can do this with an `if` or `if-else` statement.

```
age = int(input("Enter your age: "))
if age >= 18:
    print("You are old enough to vote!")
else:
    wait_time = 18 - age
    print("You can vote in", wait_time, "years.")
print("Voting is a right, and a responsibility.")
```

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Multiple `if-else` statements

Where there are multiple options to be considered, use an `if-elif-else` series of statements:

```
age = int(input("Enter your age: "))
if age < 18:
    print("You can't vote yet.")
elif age < 21:
    print("You can't drink yet.")
else:
    print("You can vote. Let's have a drink.")
```

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Multiple comparisons

You can combine comparisons using `and`, `or`, and `not`:

```
if age > 12 and age < 20:
    print("teenager")

if hungry or thirsty:
    print("Let's have a snack.")
```

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Programming – Random Numbers

It's often useful to have the computer "pick a number" from a given range of numbers.

```
import random

def main():
    # Make a random integer from 0-9
    randnum = random.randrange(10)
    print(randnum, "is between 0 and 9")

    randnum = random.randrange(100) + 1
    print(randnum, "is between 1 and 100")

main()
```

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Programming – Random Numbers

With this in mind… how would you…

```
randnum = random.randrange(100) + 1     # Example for 1-10

                                        # Roll a 1-6 die?

                                        # Roll two dice?

                                        # Print sum of dice?
```

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Program a Dice Game

How would you print "You won!" if the person "rolling the dice" gets doubles?

```
main():
    void = input("Press [Enter] to roll two dice...")
    die1 = random.randrange(6) + 1
    die2 = random.randrange(6) + 1
    print("You rolled a",die1, "and a",die2)
    if die1 == die2:
        print("You rolled doubles! You won!")
    if die1 != die2:
        print("You lost. You need doubles to win. :(")
    print("Come back again! ")

main()
```

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Assignment: Magic 8-Ball

Write a program `magic8ball.py` that:

1. has the user enter a response to a "yes/no" question
2. makes up a random number between 1 and 6, and
3. prints out a reply based on the random number

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Assignment: Guess a number

Write a program `guess_a_number.py` that:

1. makes up a random number between 1 and 10 and saves it in a variable called `randnum`
2. asks the user to guess the number (input a number and store it in a variable called `guess`
3. prints out one of three messages, depending on whether they guessed too high, guessed too low, or if they got it.

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Homework

In preparation for our discussion next week, read the article at https://www.nytimes.com/2025/12/03/magazine/chatbot-writing-style.html?unlocked_article_code=1.-k8.ya_4.aTmL4hLu7FbS&smid=url-share

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