

Demystifying *software*

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What is software?

- ▶ Anyone?
- ▶ Computer **programs**, or the non-tangible parts of computer

*I didn't start programming
when I was 10...*

Too many languages: C,
Java, Python,

Myth #1: programming is too hard

Too many platforms/SDK:
Linux, Windows, Eclipse, ...

And things are constantly changing!

Truth

- ▶ Is programming hard?
 - ▶ Yes, but much easier (and fun) to well-trained programmers
- ▶ Experience matters?
 - ▶ Yes, it matters
 - ▶ But solid understanding of principles + guided practice matter more
 - ▶ And it's not late at all!

Truth

- ▶ Too many languages?
 - ▶ Key principles remain the same
- ▶ Too many platforms?
 - ▶ Again, key principles remain the same
- ▶ Keep changing?
 - ▶ Things only change on the surface
 - ▶ Fundamental principles remain the same
 - ▶ Example: cloud computing, caching
 - ▶ *“There is nothing new under the sun”*

Myth #2: programming is NOT a sustainable career

- so I'll lose my job when I am over 40

Truth

- ▶ Experience + solid skills = invaluable

VMware Appoints Ben Fathi as Chief Technology Officer

Fathi Brings More Than 30 Years of R&D Innovation and Industry Experience to VMware Leadership Team

PALO ALTO, CA, Jan 08, 2014 (Menafn - Marketwired via COMTEX) --VMware, Inc. VMW, the global leader in virtualization and cloud infrastructure, today announced the appointment

Myth #3: programming is too easy
- so a caveman can do it



Truth



502. That's an error.

The server encountered a temporary error and could not complete your request.

Please try again in 30 seconds. That's all we know.



The application TextEdit quit unexpectedly.

Mac OS X and other applications are not affected.

Click Relaunch to launch the application again. Click Report to see more details or send a report to Apple.

Ignore

Report...

Relaunch



You are about to be logged off



Windows has encountered a critical problem and will restart automatically in one minute. Please save your work now.

Close



amazon.com

Oops!

We're very sorry, but we're having trouble doing what you just asked us to do. Please give us another chance--click the Back button on your browser and try your request again. Or start from the beginning on our [homepage](#).



facebook

Sorry, something went wrong.

We're working on getting this fixed as soon as we can.

[Go Back](#)

Facebook © 2012 · [Help](#)

Myth #4: if I am not interested in software, I don't need to study programming

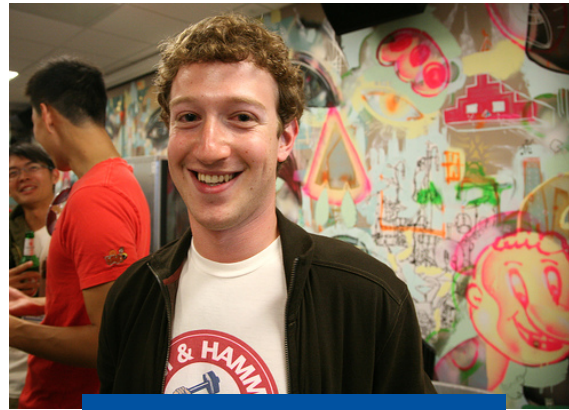
Truth

- ▶ **Programming skill is needed in many other fields**
 - ▶ Even if you're into hardware design!
 - ▶ Even your car is running on software!
 - ▶ Even if you're working in financial company
- ▶ So you'd better start early!

So will studying software lead me
to a promising career?



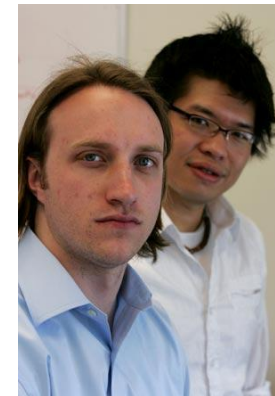
Microsoft



facebook



Google



You Tube
Broadcast Yourself

Software engineer is one of the best jobs

- ▶ **FORTUNE 100 best companies to work for**
 - ▶ #1: Google (software)
 - ▶ #2: SAS (software)
 - ▶ #6: NetApp (software)
 - ▶ #9: Ultimate Software (software)
 - ▶ 4 in top ten!
- ▶ **Software engineer is the #3 ranked best job**
 - ▶ Highly-paid, Flexibility, Less-stressful

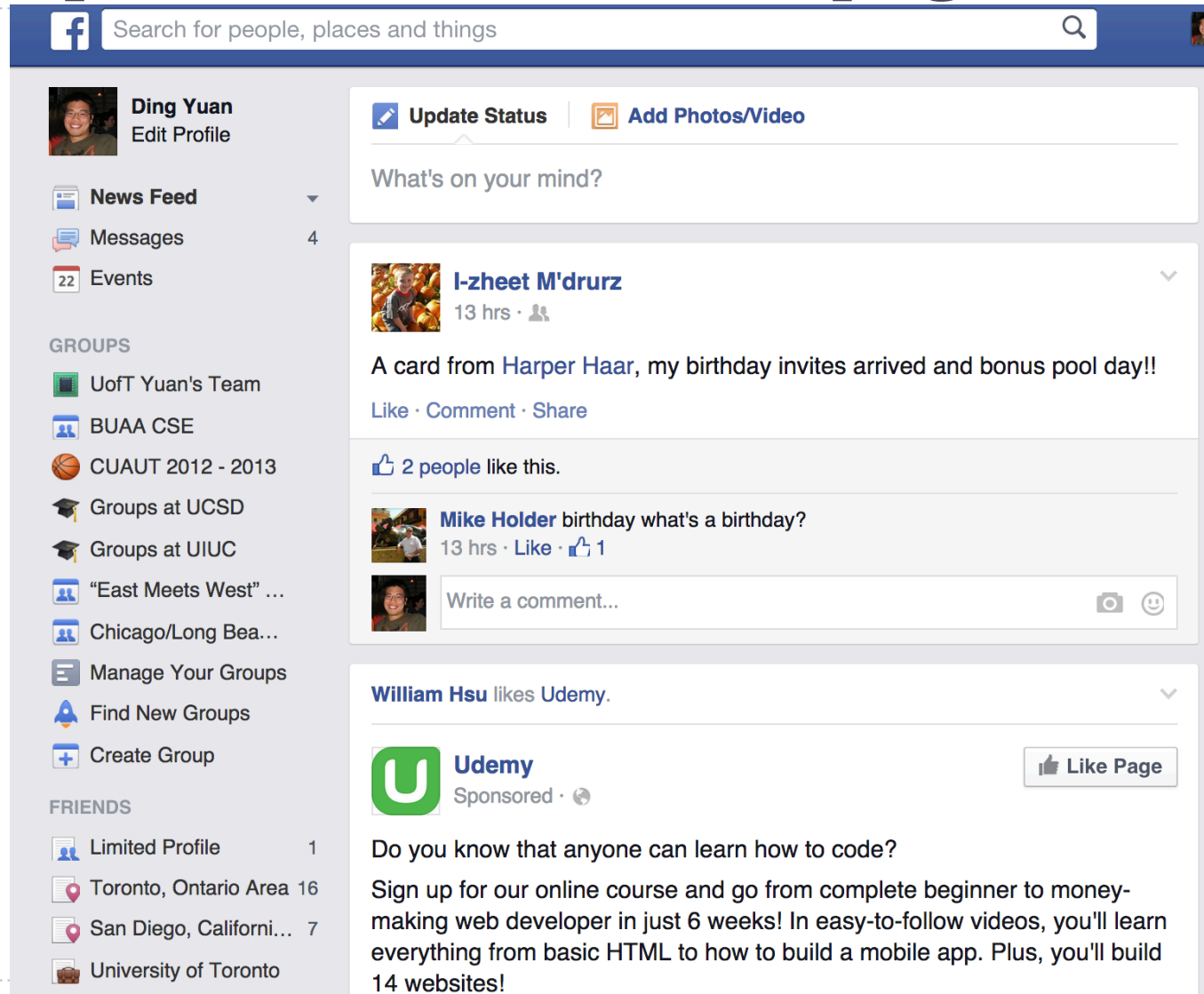
Gartner Says Worldwide Software Market Grew 4.8 Percent in 2013

Many research positions in Academia

- ▶ **Software research is influential**
 - ▶ e.g., after my papers are published, many companies request for the software we wrote (some offered money)!

How do I become a great
programmer (or, what courses
should I take?)

Example: facebook's homepage



The image shows a screenshot of the Facebook homepage layout. At the top is a blue navigation bar with the Facebook logo, a search bar, and a user profile picture. Below the navigation bar is a left sidebar with navigation links and a main content area on the right.

Navigation Links (Left Sidebar):

- News Feed**
- Messages** (4)
- Events** (22)
- GROUPS**
 - UofT Yuan's Team
 - BUAA CSE
 - CUAUT 2012 - 2013
 - Groups at UCSD
 - Groups at UIUC
 - "East Meets West" ...
 - Chicago/Long Bea...
 - Manage Your Groups
 - Find New Groups
 - Create Group
- FRIENDS**
 - Limited Profile (1)
 - Toronto, Ontario Area (16)
 - San Diego, Californi... (7)
 - University of Toronto

Main Content Area (Right):

- Update Status** | **Add Photos/Video**
- What's on your mind?**
- I-zheet M'drurz** (13 hrs · 1 person)
 - A card from [Harper Haar](#), my birthday invites arrived and bonus pool day!!
 - [Like](#) · [Comment](#) · [Share](#)
 - 2 people like this.
- Mike Holder** birthday what's a birthday? (13 hrs · [Like](#) · 1)
- Write a comment...**
- William Hsu** likes [Udemy](#).
- Udemy** (Sponsored · 1 icon)
 - [Like Page](#)
 - Do you know that anyone can learn how to code?
 - Sign up for our online course and go from complete beginner to money-making web developer in just 6 weeks! In easy-to-follow videos, you'll learn everything from basic HTML to how to build a mobile app. Plus, you'll build 14 websites!

Example: facebook's homepage

ECE 244: Programming Fundamentals

ECE 345: Algorithms & Data Structures

```
void display_homepage (user) {  
    friendlist = get_friendlist (user);  
    foreach (friend in friendlist) {  
        update = get_update_status (friend);  
        display (update);  
    }  
}
```

ECE 467: Compilers & Interpreters

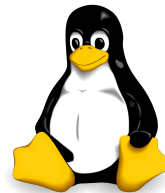
Compiler (e.g. gcc)

Machine Instructions

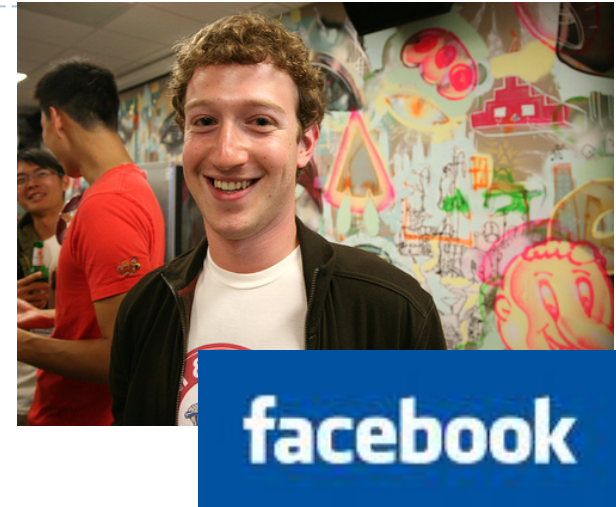
```
1010010010  
0101101010  
1010010100
```

ECE 344: Operating Systems

Operating System



ECE 243: Computer Organization



Becoming a programming *guru*

ECE 454: Computer
Systems Programming

```
void display_homepage (user) {  
    friendlist = get_friendlist (user);  
    foreach (friend in friendlist) {  
        update = get_update_status (friend);  
        display (update);  
    }  
}
```

CSC 343: Databases

ECE 540: Optimizing
Compilers

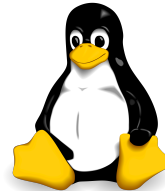
Compiler (e.g. gcc)

Machine Instructions

```
1010010010  
0101101010  
1010010100
```

ECE 468: Computer
Security

Operating
System



ECE 552: Computer
Architecture

ECE 419: Distributed
Systems



Final words

- ▶ Software offers promising career
 - ▶ And it's super **fun**!
 - ▶ Get on the boat (as early as possible)!
- ▶ How to be a good programmer?
 - ▶ Practice + practice + practice
 - ▶ Pay extra more efforts on labs!
 - ▶ *Don't be afraid* to get your hands dirty!