

COMP4021

Internet Computing

Course Details

Fall 2020

David Rossiter

COMP4021 Internet Computing

- Welcome to COMP4021 Internet Computing!
- This presentation considers basic information about the Internet and the course

The Internet

- The Internet is a huge group of **inter**-connected computer **networks**
- These networks communicate with each other through many *protocols* e.g. TCP/IP (not covered in this course)
low-level packet transportation standards.
- The next few slides show some general information about the Internet
- From <https://wearesocial.com/blog/2019/10/the-global-state-of-digital-in-october-2019>

OCT
2019

ANNUAL DIGITAL GROWTH

THE YEAR-ON-YEAR CHANGE IN KEY STATISTICAL INDICATORS

TOTAL
POPULATION



+1.0%

OCT 2018 – OCT 2019

+79 MILLION

UNIQUE
MOBILE USERS



+2.4%

OCT 2018 – OCT 2019

+123 MILLION

INTERNET
USERS



+10%

OCT 2018 – OCT 2019

+416 MILLION

ACTIVE SOCIAL
MEDIA USERS



+9.6%

OCT 2018 – OCT 2019

+328 MILLION

MOBILE SOCIAL
MEDIA USERS



+15%

OCT 2018 – OCT 2019

+476 MILLION

we
are.
social

we
are.
social

we
are.
social

OCT
2019

SOCIAL MEDIA OVERVIEW

BASED ON MONTHLY ACTIVE USERS OF THE MOST ACTIVE SOCIAL MEDIA PLATFORMS IN EACH COUNTRY / TERRITORY

TOTAL NUMBER
OF ACTIVE SOCIAL
MEDIA USERS



ACTIVE SOCIAL MEDIA
USERS AS A PERCENTAGE
OF TOTAL POPULATION



TOTAL NUMBER OF ACTIVE
SOCIAL USERS ACCESSING
VIA MOBILE DEVICES



ACTIVE MOBILE SOCIAL
USERS AS A PERCENTAGE
OF TOTAL POPULATION



3.725
BILLION

48%

3.660
BILLION

47%

SOURCES: LATEST DATA PUBLISHED BY SOCIAL MEDIA PLATFORMS VIA INVESTOR EARNINGS ANNOUNCEMENTS AND IN SELF-SERVICE ADVERTISING TOOLS; ARAB SOCIAL MEDIA REPORT; TECHRASA; NIKI AGHAEI; ROSE.RU; KEPIOS ANALYSIS (ALL TO OCTOBER 2019).

OCT
2019

FACEBOOK ACTIVITY FREQUENCY

THE MEDIAN NUMBER OF TIMES A 'TYPICAL' USER* PERFORMS EACH ACTIVITY ON FACEBOOK

NUMBER OF
FACEBOOK PAGES
LIKED (LIFETIME)



1

FEMALE: MALE:

1 1

POSTS LIKED IN
THE PAST 30 DAYS
(ALL POST TYPES)



13

FEMALE: MALE:

15 12

COMMENTS MADE IN
THE PAST 30 DAYS
(ALL POST TYPES)



5

FEMALE: MALE:

7 4

FACEBOOK POSTS
SHARED IN THE PAST 30
DAYS (ALL POST TYPES)



1

FEMALE: MALE:

2 1

FACEBOOK ADVERTS
CLICKED IN THE PAST 30
DAYS (ANY CLICK TYPE)



12

FEMALE: MALE:

14 10

SOURCE: FACEBOOK (OCTOBER 2019). *NOTE: FIGURES REPRESENT MEDIAN VALUES FOR FACEBOOK USERS AROUND THE WORLD AGED 18 AND ABOVE WHO WERE SHOWN ADS ON FACEBOOK IN THE PAST 30 DAYS.

OCT
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WORLD'S MOST VISITED WEBSITES (SIMILARWEB)

SIMILARWEB'S RANKING OF THE WORLD'S MOST VISITED WEBSITES, BASED ON TOTAL GLOBAL WEBSITE TRAFFIC

#	WEBSITE	TIME / VISIT	PAGES / VISIT
01	GOOGLE.COM	10M 38S	8.45
02	YOUTUBE.COM	23M 08S	9.78
03	FACEBOOK.COM	11M 30S	10.55
04	BAIDU.COM	7M 39S	8.48
05	WIKIPEDIA.ORG	3M 48S	2.91
06	TWITTER.COM	10M 04S	10.15
07	INSTAGRAM.COM	7M 14S	13.35
08	YAHOO.COM	7M 31S	6.90
09	XVIDEOS.COM	12M 36S	9.61
10	YANDEX.RU	10M 50S	8.99

#	WEBSITE	TIME / VISIT	PAGES / VISIT
11	PORNHUB.COM	9M 39S	7.87
12	XNXX.COM	15M 22S	11.11
13	LIVE.COM	8M 07S	8.46
14	YAHOO.CO.JP	10M 23S	7.49
15	BIT.LY	0M 42S	1.18
16	NETFLIX.COM	9M 58S	4.20
17	AMAZON.COM	6M 54S	8.50
18	NAVER.COM	16M 30S	10.99
19	VK.COM	17M 50S	23.20
20	WHATSAPP.COM	2M 40S	1.90

SOURCE: SIMILARWEB (SEPTEMBER 2019). NOTE: 'TIME PER VISIT' FIGURES REPRESENT THE AVERAGE DURATION OF USERS' VISITS, MEASURED IN MINUTES AND SECONDS.

ADVISORY: SOME WEBSITES FEATURED IN THIS RANKING MAY CONTAIN ADULT CONTENT. PLEASE USE CAUTION WHEN VISITING UNKNOWN WEBSITES.

OCT
2019

MOBILE APP RANKINGS: Q3 MONTHLY ACTIVE USERS

RANKINGS OF TOP MOBILE APPS AND GAMES BY THE AVERAGE NUMBER OF **MONTHLY ACTIVE USERS** BETWEEN 01 JULY AND 30 SEPTEMBER 2019

RANKING OF MOBILE **APPS** BY **MONTHLY ACTIVE USERS**

#	APP NAME	DEVELOPER
01	WHATSAPP	FACEBOOK
02	FACEBOOK	FACEBOOK
03	FACEBOOK MESSENGER	FACEBOOK
04	WECHAT	TENCENT
05	INSTAGRAM	FACEBOOK
06	TIKTOK	BYTEDANCE
07	ALIPAY	we are. social
08	QQ	TENCENT
09	TAOBIAO	ALIBABA
10	BAIDU	BAIDU

RANKING OF MOBILE **GAMES** BY **MONTHLY ACTIVE USERS**

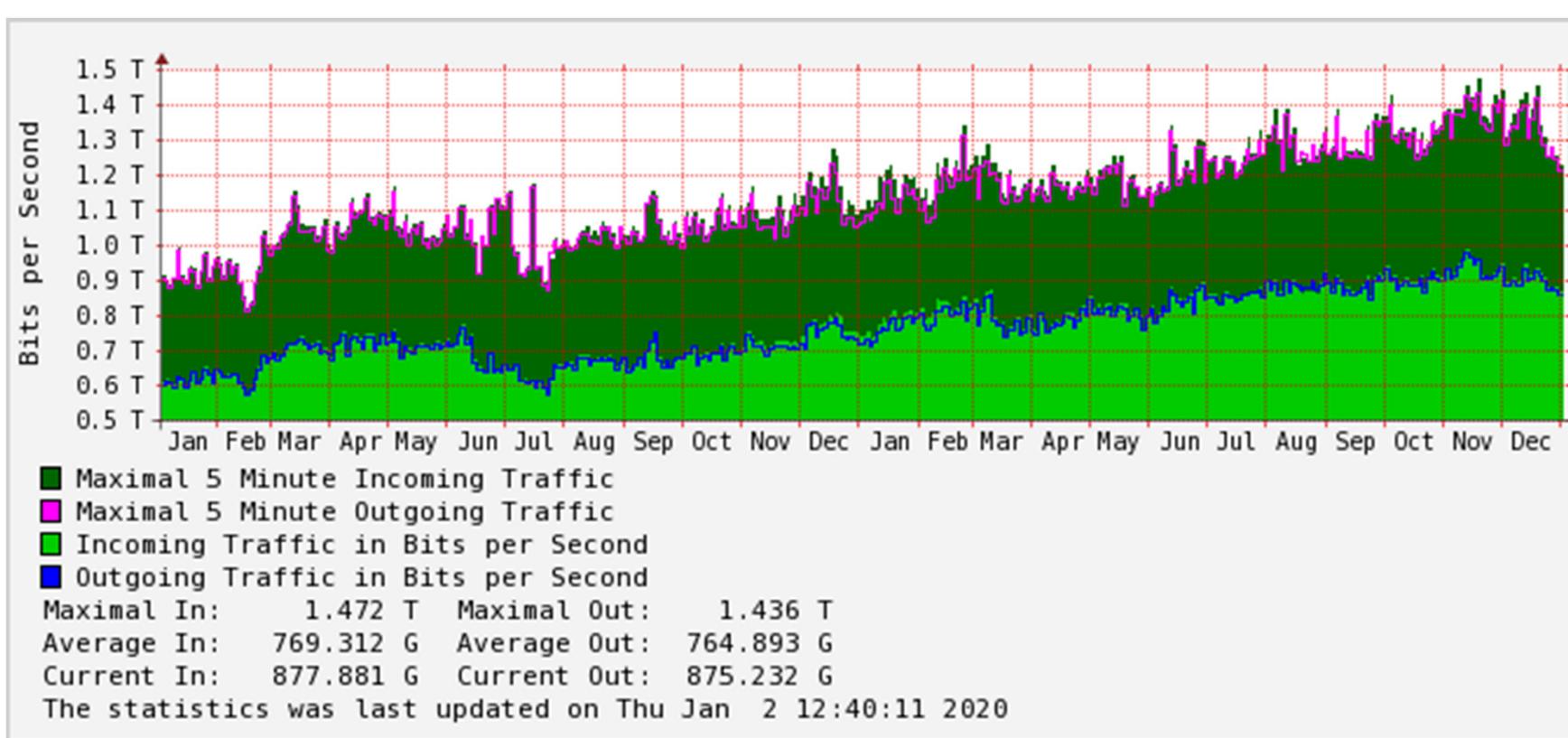
#	GAME NAME	DEVELOPER
01	PUBG MOBILE	TENCENT
02	CANDY CRUSH SAGA	ACTIVISION
03	HONOUR OF KINGS	TENCENT
04	GAME FOR PEACE	TENCENT
05	ANIPOP	HAPPY ELEMENTS
06	POKÉMON GO	NIANTIC
07	CLASH OF CLANS	SUPERCELL
08	SUBWAY SURFERS	KILOO
09	CLASH ROYALE	SUPERCELL
10	MINECRAFT POCKET EDITION	MICROSOFT

SOURCE: APP ANNIE (OCTOBER 2019). BASED ON COMBINED DATA FOR THE GOOGLE PLAY AND APPLE iOS APP STORES.
NOTE: DOES NOT INCLUDE DATA FOR APPS DOWNLOADED FROM THIRD-PARTY ANDROID STORES.

HK Internet Growth

- HKIX means ‘the Hong Kong Internet Exchange’
- It’s a central place for exchanging web traffic

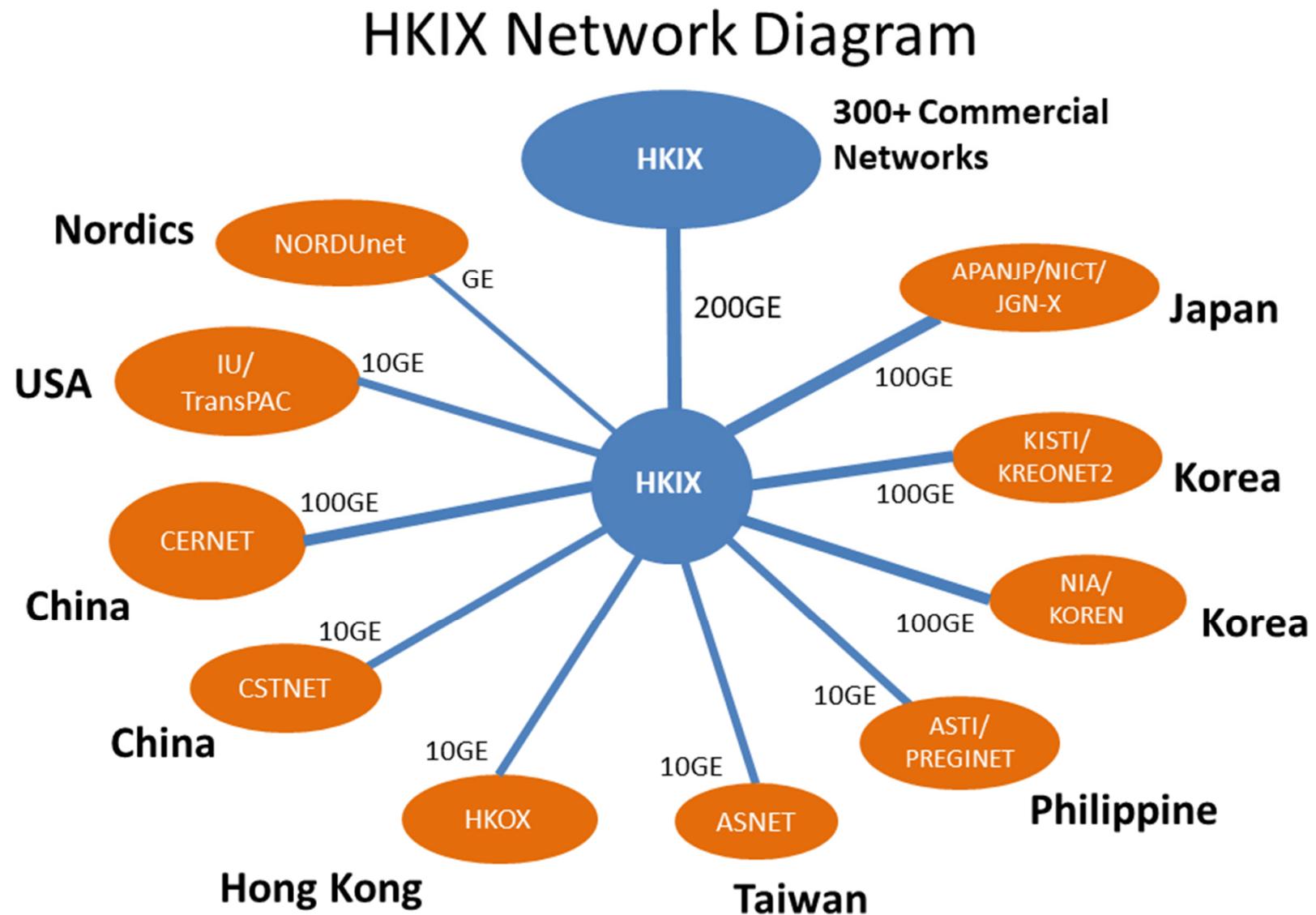
Over two years ~45% more traffic



From <http://www.hkix.net/hkix/stat/aggt/hkix-aggregate.html>



- For example, if you are in HK and load a web page from Japan, the request for the web page and the reply (the web page) probably goes through the HKIX



Key Layers of the Internet



- We are mainly focused on this part, using a programming point of view

From https://en.wikipedia.org/wiki/World_Wide_Web

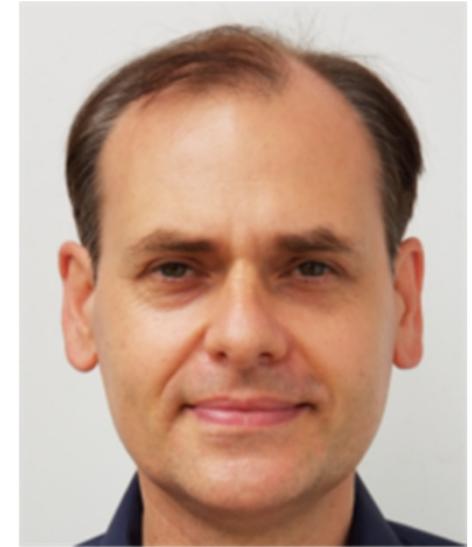


- There are many hundreds of web technologies
- There's no way we can look at them all
- We need to have a compromise between breadth (how many) and depth (how deep)

You can propose a course project that looks into one of the web technologies.
(choose the project topic that fits your future path >.<

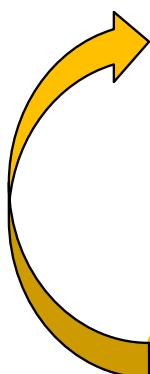
People

- Course Instructor
 - David ROSSITER
 - Email: rossiter@cse.ust.hk
 - Office: Rm 3554
- Teaching Assistants
 - CHENG Ho Kei, hkchengad@ust.hk
 - XIE Wentao, wxieaj@ust.hk
- The best way to contact us is email
 - don't use the canvas system to contact us, it doesn't work properly!



COMP4021 Simple History

- 1999: I proposed & built the course
- Early years: HTML, JavaScript and Perl
- Mid 2000's: CSS, Flash, Using Applets, PHP, SVG, XML
- Mid 2010's: HTML5, AJAX, jQuery
- Spring 2018: Big update by Dr Gibson Lam
- Since then: More improvements by me



*If you take COMP4021 in the Fall semester
you get a course based on the previous version*

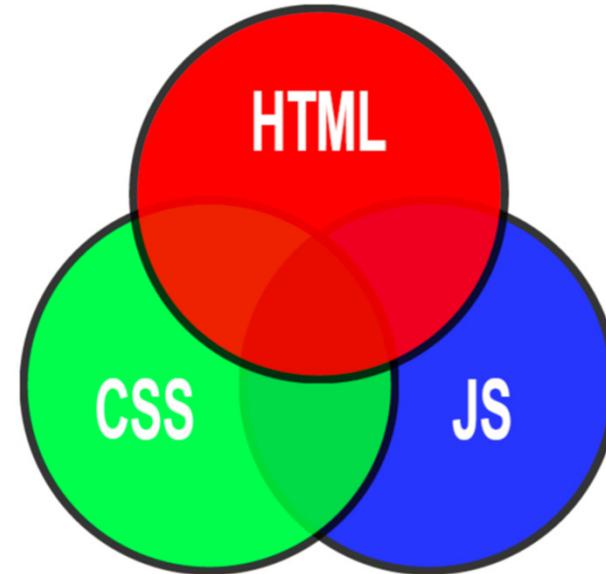
Students on this Course

- Roughly 3 year 3 students
 - Roughly 62 year 4 students
 - ~65 students in total
- 
- It's more common to have roughly half year 3 students, but somehow it's not like that this semester

What useful things to do in the course project? Probably help you look for jobs?

My MOOC Course

- During 2016-2018,
I had a
MOOC course
'HTML, CSS &
JavaScript'
- A subset of that
material may be
in some lectures



The screenshot shows a web browser displaying the Coursera course page for 'HTML, CSS and JavaScript'. The URL in the address bar is <https://www.coursera.org/learn/html-css-javascript>. The page navigation shows 'Home > Computer Science > Mobile and Web Development'. The main title 'HTML, CSS and JavaScript' is prominently displayed. Below the title, a 'About this course' section provides a brief description of the course content, mentioning the essential elements of web page development, including HTML, CSS, and JavaScript, and noting that no previous experience is necessary.

About this course: This course will teach you the essential elements of web page development, covering HTML, CSS and JavaScript. No previous experience of these technologies is necessary, although it is helpful if you have some prior programming experience. First, HTML together with CSS are discussed and explored. Then we move on to consider the essential components of JavaScript, including variables, arrays, loops, events and functions. Then we explore more advanced elements of JavaScript control, including advanced use of functions, event control, array processing, and DOM manipulation.

My MOOC Course



6,307 Ratings

4.7 out of 5 stars

Total Visitors

317,118

▲ 38

Active Learners

111,258

▲ 7

Payments

9,490

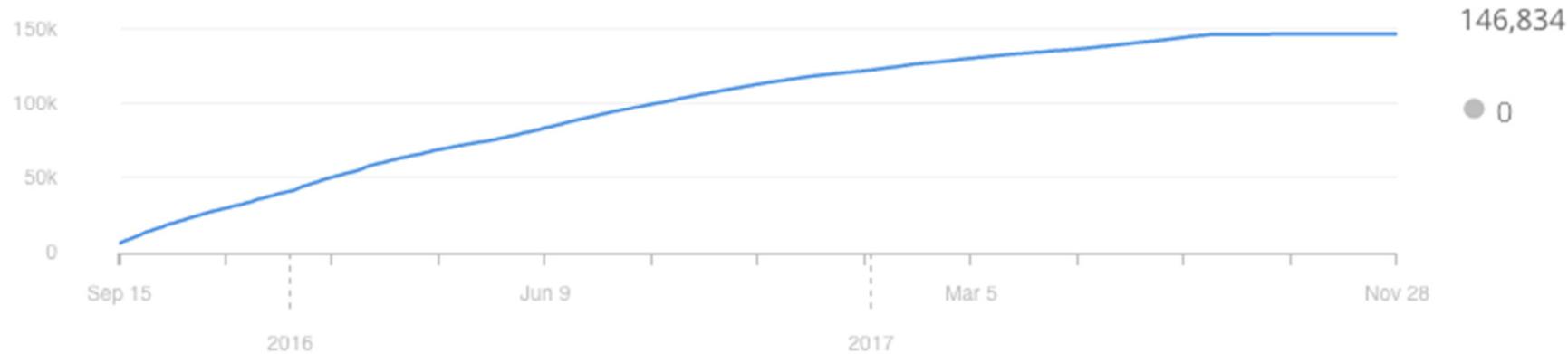
● 0

Course Completers

15,502

▲ 2

Total Enrolled Learners



Course Description

- Here is the official course description:

PRE-REQUISITE	COMP 2012 OR COMP 2012H
DESCRIPTION	Technologies and standards for World Wide Web (WWW), user interfaces and Browsers, authoring tools, Internet protocols, Internet servers, database connectivity, Robots, Search engines, server-side programming, client-side programming, security and privacy, recent advances.

- It's out of date
 - I will try to 'boost' the things which are more relevant to 2020 and dump some of the things which aren't – see next slides

Official Course Outcomes

- At the completion of this course students will be able to:
 1. Appreciate the impact of Internet on society
 2. Assess HTML and related display techniques including CSS
 3. Build browser-based programs using the JavaScript language, including DHTML and event handling
- *JavaScript & event handling are important*
 - *Boring!*
 - *Essential basics*
 - *Nobody says DHTML (Dynamic HTML) any more!*

Official Course Outcomes

4. Program advanced browser display technologies including SVG, and differentiate between the technologies
5. Develop code for handling communication between web page components such as JavaScript
 - *The graphics language SVG is standard in browsers now, and is useful to know*
 - *This is talking about communicating between web page components such as Flash and JavaScript*
 - *That's all gone now, JavaScript controls everything*

Official Course Outcomes

6. Install and describe the operation of a server such as Apache and develop server side code in an appropriate language such as PHP

- *PHP is ‘old’ but still very popular and useful* Almost the No.1 server-side language
- *Understanding some HTTP instructions is very useful*
- *Cookies are very useful*

Official Course Outcomes

8. Identify XML and related technologies including DOM handling.

DOM: a tree structure for storing something in the webpage.

- *DOM understanding is very important*

9. Develop complex programs for browser-server communications, including use of Ajax.

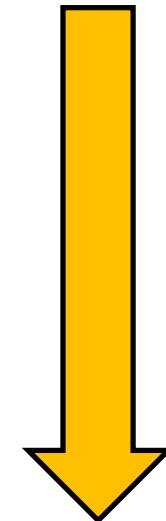
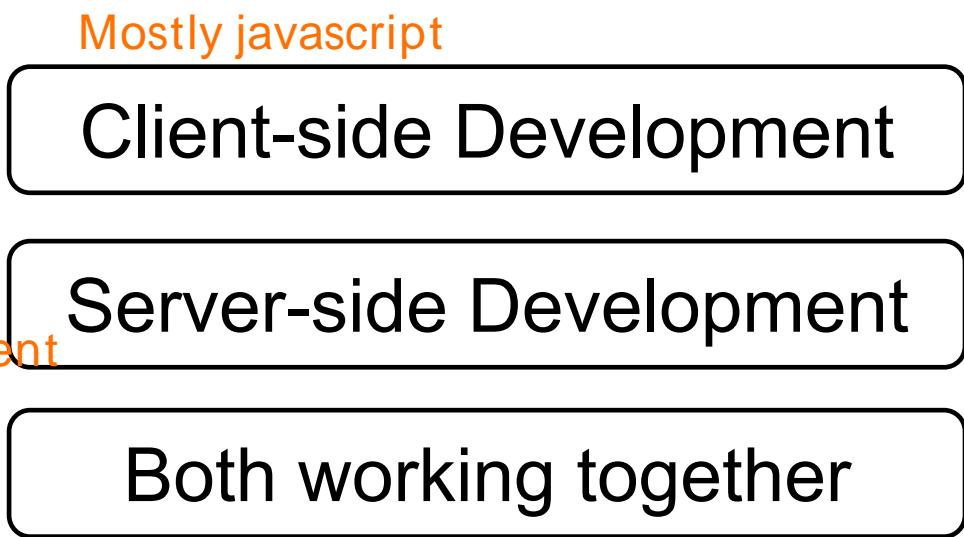
- *In some situations XML has been replaced by other forms of data representation, but it's still very useful to understand it*

- *Ajax is important*

Course Outline

- The course is roughly divided into these 3 components:

= browser side
10 years ago javascript went into server-side as well.



We will roughly work in this order during the semester

Which Browser to Use?

- There are many web standards
- In theory most browsers can handle them, but in reality some are better than others
- We will only use Google Chrome
 - Chrome is powerful and usually up-to-date
 - However, like all software it can have bugs
 - Sometimes you may find it useful to try something you have developed in another browser, e.g. Firefox/ Microsoft Edge/ Safari

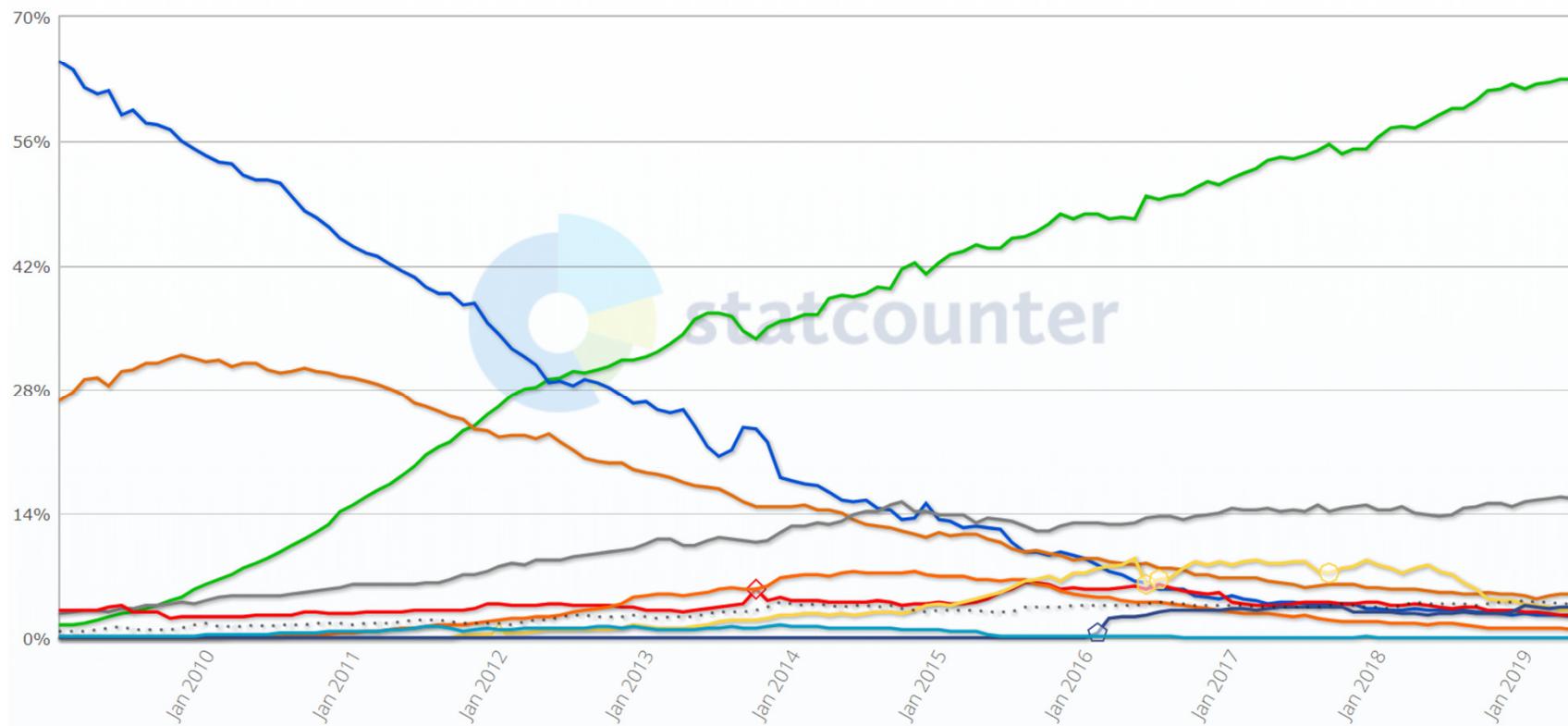
Browser Popularity

[https://en.wikipedia.org/wiki/
Usage_share_of_web_browsers](https://en.wikipedia.org/wiki/Usage_share_of_web_browsers)



Browser Market Share Worldwide

Jan 2009 - May 2019



Schedule for Normal Teaching

- Lectures
 - Wednesdays 3:00-3:50pm, Rm 2465
 - Fridays 3:00-3:50pm, Rm 2465
- Labs
 - Tuesdays 3:00-4:50pm, Rm 4210 (CS lab 4)
 - However, at the moment we do not have ‘normal’ teaching

The Arrangement Now

- Lectures
 - See next slide
 - Wednesdays 3:00-3:50pm, Rm 2465 
 - Fridays 3:00-3:50pm, Rm 2465 
- Labs
 - See the slide after next
 - Tuesdays 3:00-4:50pm, Rm 4210 (CS lab 4) 
 - Labs will have video recorded guides & TA support

Wednesdays

- The Wednesday lecture timeslot will be replaced with a zoom session in which I do some or all of these:
 - No new material
 - (Quick) recap of recently covered material
 - Some review questions; see slide later
 - A look at a forthcoming lab
 - A look at some related web sites/ examples
 - Handling any queries

Fridays

- Teaching via zoom is slower and less efficient than some other forms of teaching
- The Friday lecture will be replaced with specially made ‘high efficiency’ recorded videos with PDF notes & examples (the ‘flipped classroom’ idea)
- There won’t be a zoom session during the Friday lecture timeslot

Main Course Web Site

- All course information is presented via the web at
<http://course.cse.ust.hk/comp4021/>

COMP4021 Internet Computing Spring 2020

Canvas site
Academic calendar
Jump to week:
1

Latest Information

- There are no labs in the first two weeks of the semester
- If you don't have a CSD account, please go [here](#) to register one (you may have to wait a day or two after joining the course before doing this)

Week

1

FEB

S M T W T F S
16 17 18 19 20 21 22

L1: 19 Feb & 21 Feb
Labs: No labs

Lecture 1

Lecture 2

Lab Session

 **Course Details** [[1spp](#), [4spp](#), [6spp](#), [9spp](#)]

- Please go [here](#) to register your CSD account (you may have to wait a day or two after joining the course before doing this)

 **HTML** [[1spp](#), [4spp](#), [6spp](#), [9spp](#)]

- Examples used in the notes [here](#)
- Video [here](#)

- There are no labs in the first two weeks of the semester

- You need to log on using your CSD account details if you are off campus

Course Notes



HTML [1spp, 4spp, 6spp, 9spp]

- **1spp / 4spp / 6spp / 9spp** means
1/ 4/ 6/ 9 slides per page
- All notes are colour, with no background, so they are good for screen viewing and printing
- Most notes have examples, try them out!

The HKUST Canvas Web Site

The screenshot shows the Canvas course page for COMP4021 (L1). The left sidebar has a red background with white icons and text. It includes links for Account, Dashboard, Courses, Calendar, SFQ, and Zoom Meeting. The main content area shows the course title "COMP4021 (L1) - Internet Computing". Below it, a message says "Hello Students!" and provides a link to the main course website: <https://course.cse.ust.hk/comp4021>. It also mentions using Zoom for sessions and provides a link to the ITSC Student Guide.

COMP4021 (L1)

2019-20 SPRING

Home

Zoom Meeting

COMP4021 (L1) - Internet Computing

Hello Students!

The main COMP4021 website is here:

<https://course.cse.ust.hk/comp4021>

Please go there to get the latest course information.

Using Zoom

We will use the Zoom software (<https://hkust.zoom.us/>). To join the Zoom sessions you can use the links shown [here](#).

You can refer to the ITSC Student Guide on how to use Zoom [here](#).

- Our course will not use canvas to release course materials
- We will use canvas for handling lab submissions, online exams, and scheduled Zoom meetings – which will be recorded and released

Zoom Meetings

- You can find the Zoom meetings that have been set up for lectures and labs inside canvas:

The screenshot shows the Canvas LMS interface for the course COMP4021 (L1) - Internet Computing. The left sidebar has a red background with various icons and links: canvas logo, Account, Dashboard (selected), Courses, Calendar, SFQ, and Inbox. The main content area shows the Zoom integration page. At the top, it says "Your current Time Zone is (GMT+08:00) Hong Kong." Below this, there are three tabs: "Upcoming Meetings" (selected), "Previous Meetings", and "Cloud Recordings". The "Upcoming Meetings" table lists two meetings:

Start Time	Topic	Meeting ID	Action
Tomorrow (Recurring) 3:00 PM	COMP4021 (L1) - Internet Computing	440-543-689	Join Invitation
Fri, Feb 21 (Recurring) 3:00 PM	COMP4021 (L1) - Internet Computing	440-543-689	Join Invitation

Zoom IDs and Links

COMP4021 (L1) - Internet Computing

Hello Students!

The main COMP4021 website is here:

<https://course.cse.ust.hk/comp4021>

Please go there to get the latest course information.

Using Zoom

We will use the Zoom software (<https://hkust.zoom.us/>). To join the Zoom sessions you can use the links shown [here](#).

You can refer to the ITSC Student Guide on how to use Zoom [here](#).

- You can see a summary of the course Zoom meetings in a page inside canvas

Zoom IDs and Links

Here are the Zoom IDs and links of the Zoom meetings for the lectures:

Lecture Section (start time)	Zoom ID	Zoom Link
Lecture - L1 (Wed 3pm)	440-543-689	https://hkust.zoom.us/j/440543689

During Zoom Sessions

- Your audio and video should be automatically muted when you join a course Zoom meeting
- Please don't unmute the audio unless you are asking a question, otherwise the background sound will drive everyone crazy!



No Course Textbook

- There is no textbook for this course
- You can find plenty of helpful resources on the web – but be careful, random web material can be out of date

w3schools.com

THE WORLD'S LARGEST WEB DEVELOPER SITE

- You can find some of the things that we cover in <http://www.w3schools.com>

Lectures

- The lectures give a good introduction to the concepts with examples and demos
 - I won't take attendance in the lectures (this is true for on-line and any face-to-face teaching)
 - Towards the end of semester as we get closer to the project deadline some lectures may be given to project work sessions

Labs

- The labs give you a chance to take your understanding deeper
- We won't take attendance in the labs
(this is true for on-line and any face-to-face teaching)
- For the course project, one possibility is that you extend some of the lab work

Lab Venue

- If we return to normal teaching and TAs are available, we will have lab teaching here
- Room 4210, also called 'CS Lab 4'
 - Near lift 19 in the Computer Science lab area
 - You could use <http://pathadvisor.ust.hk> to find it:



Going to the Labs

- At this moment, we are still working out the best way to handle labs
- We hope to provide video lab instructions for the early labs, and perhaps for all labs
- Then you can do the lab work by yourself by looking at the lab pages and watching those lab videos
- We will also provide some form of TA support
- More details later

Course Marks

- You need to hand in 3 labs, $3 * 10\% = 30\%$
- There will be a midterm 30%
- There will be a course project 40%
- Any question points you get
are added on top of these marks

The Labs (30%)

- 3 of the lab projects need to be handed in
- Each is worth 10%

Midterm (30%)

- Probably, we will use canvas.ust.hk for this

Course Project (40%)

- You need to work on a course project
- This can be a group (2 or 3) or a single person project
- You can propose almost anything
- I need to approve your proposal before you begin
- A great advantage of the project is that you can use it to explore what you are interested in
- More details will be given later

The Final Exam

- What about the final exam?
- There won't be one!

Bonus Lecture Marks

- I will try to do questions during the Wednesday Zoom sessions
- The details are still being worked out
- Everyone who gets an answer correct will get an extra 0.6%, which is simply added to the end-of-semester mark

Cheating Policy

- If you get caught cheating, both you and the other person get zero for that work, also your end-of-semester grade is lowered two sub-grades i.e. a B- grade becomes C
- It doesn't matter if you only copied a little, the penalty is the same for both the source and the copier
- Copying anything from a previous semester is also cheating, make sure you only use material from this semester



Some Interesting Things I Have Heard

- I lent my USB drive to others and forgot my work was on it!
- I lent my work to others only for their reference!
- I submitted someone else's work by mistake!
- My friend prepared a template which I used to do the work, and I forgot to remove his name!
- And so on... sorry, all these kinds of things get zero



Things That Are OK to Do

- Discussing the work with others is OK; that's different from direct copying
- Another thing you might find helpful is to search the web (obviously)
- You are welcome to **learn** from any material on the web

Your Computer Accounts

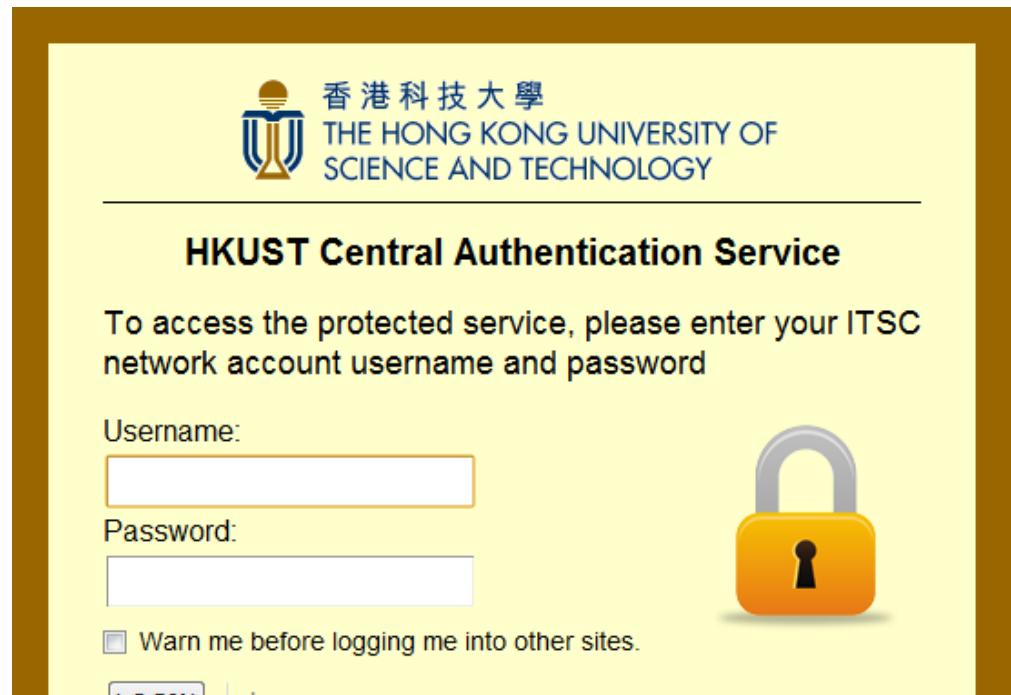
- You have two computer accounts:
 - Your ITSC account
 - This is given to you when you join UST
 - This is your main email account at UST
 - Your CSD account
 - This is given to you when you first join a COMP course
- Before you can access the main course web site or log in to the lab room computers you need to have a CSD account – first enable it, if you haven't got one

How to Enable Your CSD Account

- Run a browser, go to:

<https://password.cse.ust.hk:8443/pass.html>

- Log in using your ITSC details



The image shows a screenshot of the HKUST Central Authentication Service login page. The page has a yellow background with a brown border. At the top, there is the Hong Kong University of Science and Technology logo and the text "香港科技大學 THE HONG KONG UNIVERSITY OF SCIENCE AND TECHNOLOGY". Below this, the text "HKUST Central Authentication Service" is displayed in bold. A message reads: "To access the protected service, please enter your ITSC network account username and password". There are two input fields: "Username:" and "Password:", both with white backgrounds and orange borders. To the right of the password field is a yellow padlock icon with a keyhole. At the bottom left, there is a checkbox labeled "Warn me before logging me into other sites." and a "Log in" button.

How to Enable Your CSD Account

CSD Password Setting Service

You may set your password for CSD machines (both Unix workstations and PC).

Steps:

1. CSD account name should normally be your ITSC account name.
2. If you are UG students, do not check the box for Faculty/PG domain.
3. Fill in the form, click "Go UPDATE" when finished.

The screenshot shows a web-based password reset form. The top part of the form is highlighted with a yellow box. The bottom section, which includes the checkboxes and buttons, is also highlighted with a yellow box. Three yellow arrows point from the numbered steps on the left to these specific areas: one arrow points to the top yellow box, another points to the bottom yellow box, and a third points to the 'Go UPDATE' button.

3. Finally, click 'Go UPDATE'

- You will see something like this:

Password Changing Result

Password changing for cs_abc at 'Unix A/C for UG' **COMPLETED**.

You UNIX password will be activated in **5** minutes. Please try logging in then.

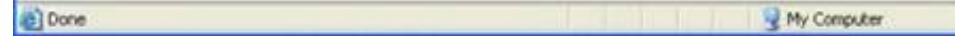
Password changing for cs_abc at 'PC A/C at domain CSD' **COMPLETED**.

Note:

Please kill off your Browser window **NOW!**

Otherwise, any other people can change password **AS YOU**.

- cssystem@cs.ust.hk



- You need to wait 5-10 minutes before your CSD account is activated
- Now you can access any CSD computers i.e. the computers we will use in CS lab 4 (room 4210)
- Enable your account before the lab begins!