

COMP4021
Internet Computing

Course Details
Spring 2022

Gibson Lam

COMP4021 Internet Computing

- Welcome to COMP4021 Internet Computing!
- This course covers:
 - **Internet:** how the Internet works
 - **Computing:** how do you work inside the Internet
- This presentation goes through all the 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)
- The next few slides show some general information about the Internet
(From <https://wearesocial.com/hk/blog/2022/01/digital-2022-another-year-of-bumper-growth/>)

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ESSENTIAL DIGITAL HEADLINES

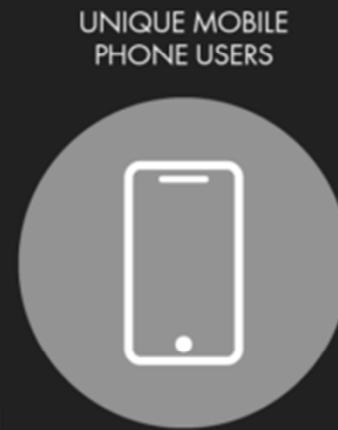
OVERVIEW OF THE ADOPTION AND USE OF CONNECTED DEVICES AND SERVICES



7.91
BILLION

URBANISATION

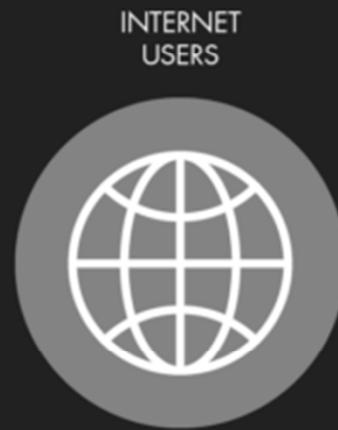
57.0%



5.31
BILLION

vs. POPULATION

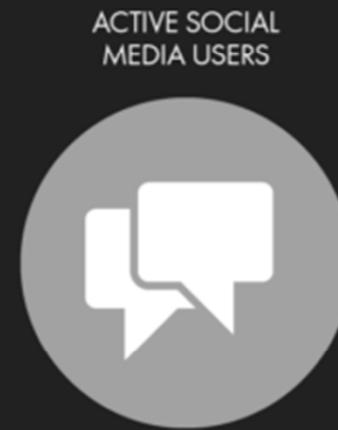
67.1%



4.95
BILLION

vs. POPULATION

62.5%



4.62
BILLION

vs. POPULATION

58.4%

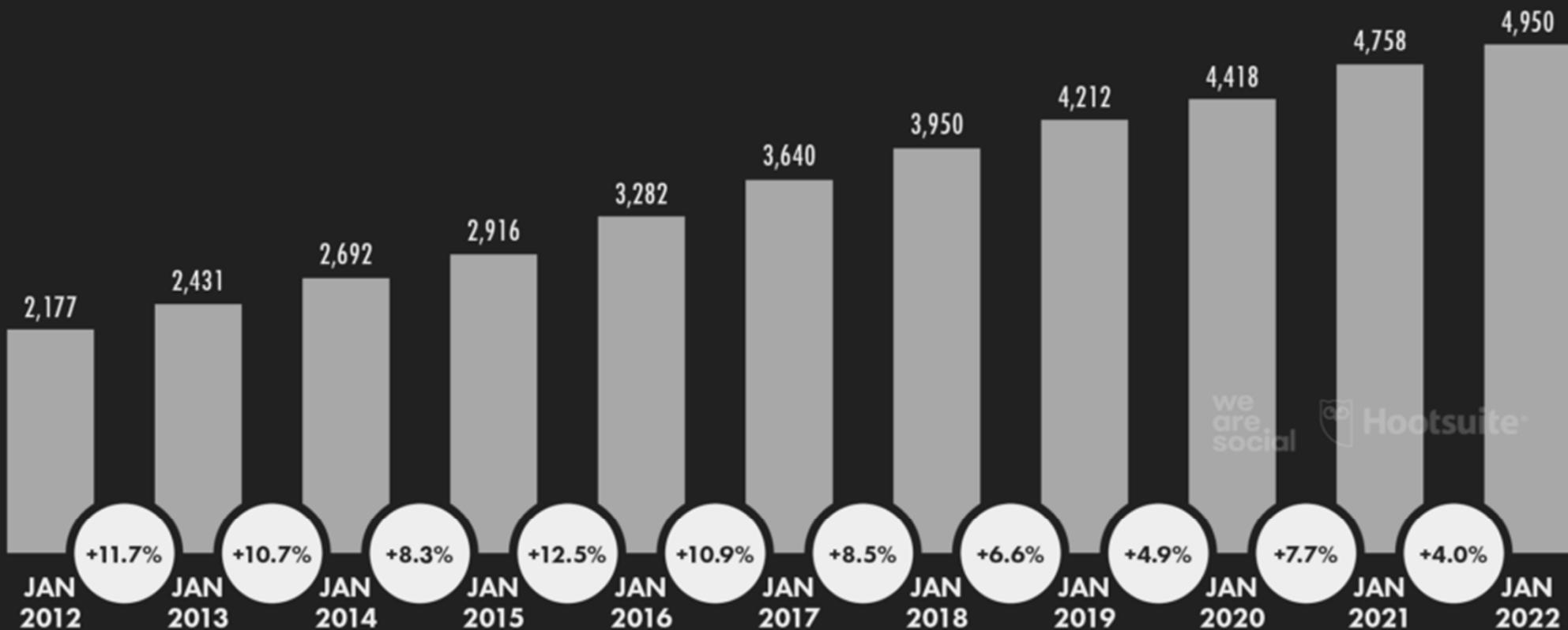
9
SOURCES: UNITED NATIONS; U.S. CENSUS BUREAU; GOVERNMENT BODIES; GSMA INTELLIGENCE; ITU; GW; EUROSTAT; CNNIC; APJII; CIA WORLD FACTBOOK; COMPANY ADVERTISING RESOURCES AND EARNINGS REPORTS; OCDH; TECHRASA; KEPIOS ANALYSIS. ADVISORY: SOCIAL MEDIA USERS MAY NOT REPRESENT UNIQUE INDIVIDUALS. COMPARABILITY: SOURCE AND BASE CHANGES.



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INTERNET USERS OVER TIME

NUMBER OF INTERNET USERS (IN MILLIONS) AND YEAR-ON-YEAR CHANGE



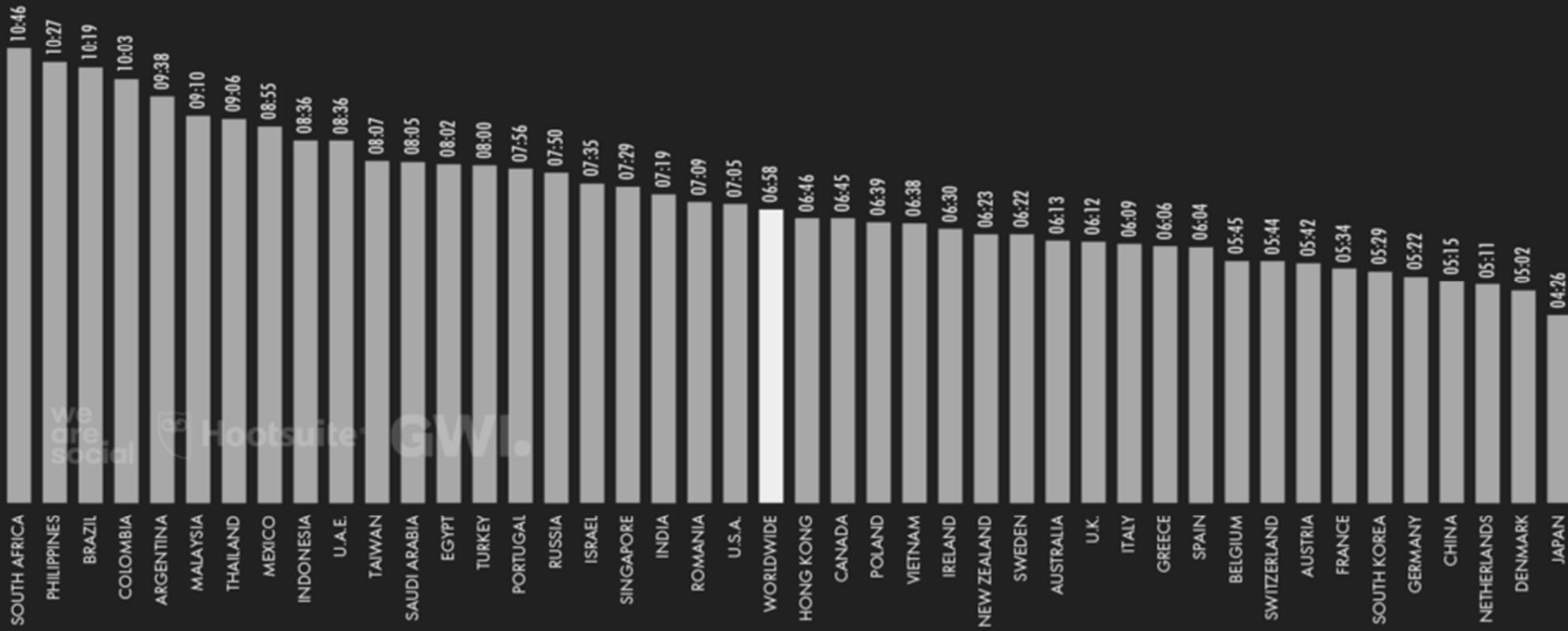
SOURCES: KEPiOS ANALYSIS; ITU; GSMA INTELLIGENCE; EUROSTAT; GWI; CIA WORLD FACTBOOK; CNNIC; APJI; LOCAL GOVERNMENT AUTHORITIES. ADVISORY: DUE TO COVID-19-RELATED DELAYS IN RESEARCH AND REPORTING, FIGURES FOR INTERNET USER GROWTH AFTER 2020 MAY UNDER-REPRESENT ACTUAL TRENDS. SEE NOTES ON DATA FOR MORE DETAILS. COMPARABILITY: SOURCE AND BASE CHANGES. FIGURES MAY NOT MATCH OR CORRELATE WITH FIGURES PUBLISHED IN PREVIOUS REPORTS.

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DAILY TIME SPENT USING THE INTERNET

AVERAGE AMOUNT OF TIME (IN HOURS AND MINUTES) THAT INTERNET USERS AGED 16 TO 64 SPEND USING THE INTERNET EACH DAY ON ANY DEVICE



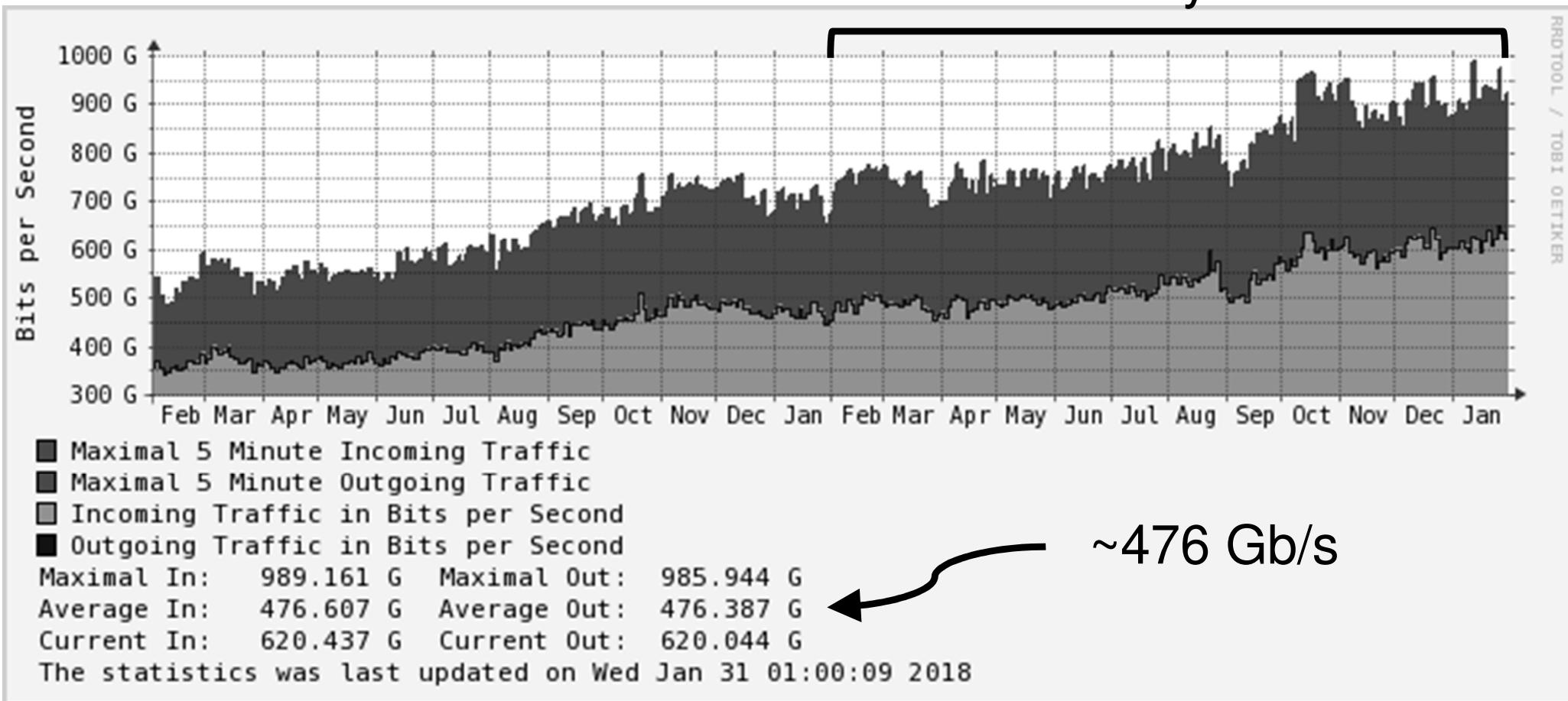
SOURCE: GWI (Q3 2021). FIGURES REPRESENT THE FINDINGS OF A BROAD GLOBAL SURVEY OF INTERNET USERS AGED 16 TO 64. SEE GWI.COM FOR FULL DETAILS.

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HK Internet Traffic Growth (2018)

- HKIX means ‘the Hong Kong Internet Exchange’

One year

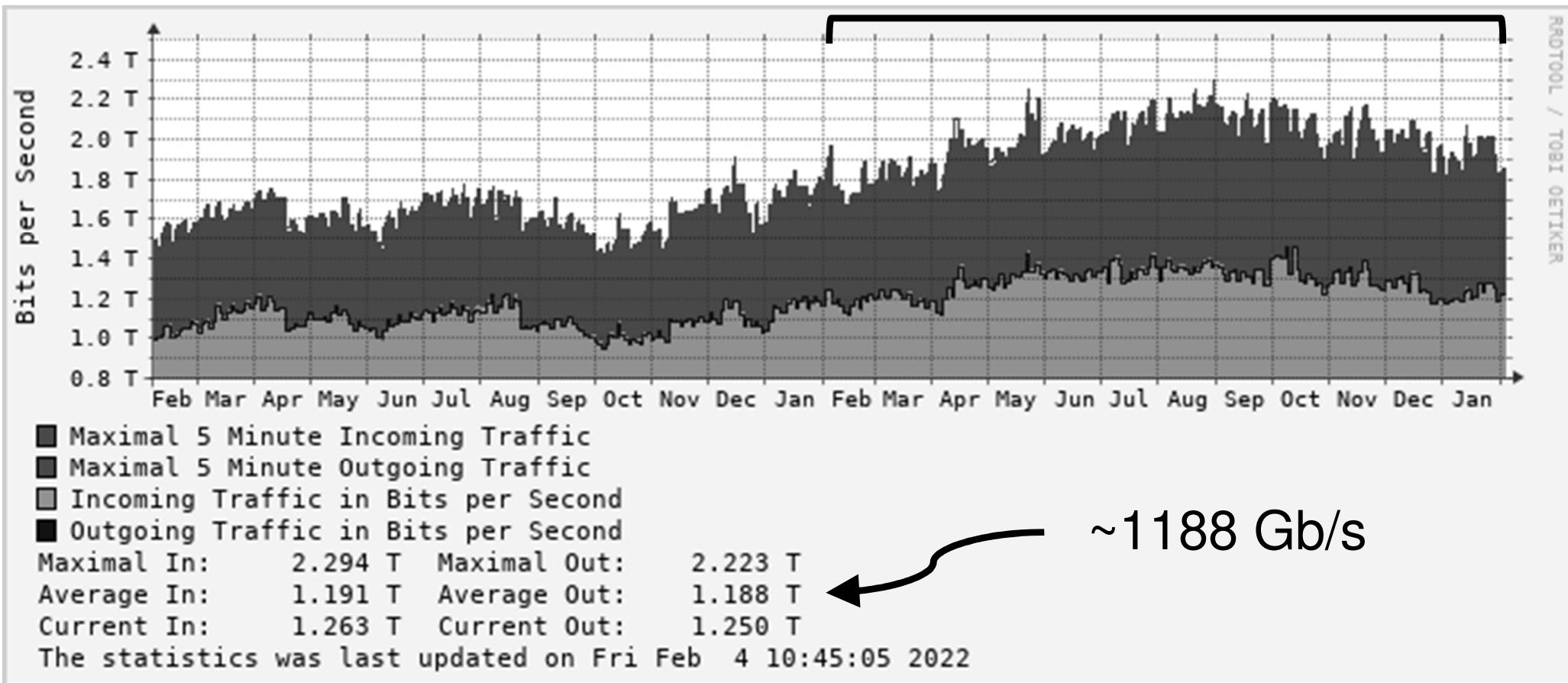


From <http://www.hkix.net/hkix/stat/aggt/hkix-aggregate.html>

HK Internet Traffic Growth (2022)

- The traffic keeps on increasing and has been more than doubled since 2018

One year



Key Layers of the Internet

CONTENT

SEARCH ENGINE*

BROWSERS

WORLD WIDE WEB

INTERNET

NETWORKS

COMPUTERS



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

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

The Web Stack

- The web stack, loosely speaking, is the description of the different components, from front-end to back-end that you have to work on for a complete web solution
- There are different technologies at each level so there are many different variations of web stack

Interface

Web Server

Database

Platform

JAVASCRIPT LIBRARIES

UNDERSCORE.JS

BACKBONE.JS



Moment.js

LO

jQuery mobile

jQuery

React

jQuery
user interface

Some Web Technologies

DATABASES

mongoDB

MariaDB

PostgreSQL

The redis logo, which consists of three stacked cubes.

redis

MySQL®

FRONT-END FRAMEWORKS

B
Bootstrap

Foundation

S
Semantic UI

uikit

FRAMEWORKS FOR WEB APPLICATION

The ASP.NET logo, featuring a stylized 'A' inside a hexagon.

ASP.NET

METEOR
django

ANGULARJS

ember

CakePHP

CodeIgniter

Flask

PROGRAMMING LANGUAGES

SQL

The Scala logo, featuring a wavy line.

Scala

css

The PHP logo, featuring a stylized letter 'P' inside a gear-like shape.

php

HTML

node

The Node.js logo, featuring a small JS icon.

JS

elixir



Which One to Learn?

- The previous slide shows many different web technologies and there are hundreds more available
- It is not possible to look at them all and we don't need to!
- We will learn some of them, focusing on learning the fundamentals
- You will be able to apply the same concepts on other libraries/frameworks

Which Browser to Use?

- In theory most browsers can handle web applications, but in reality, some are better than others
- We will focus on 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

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.

- Unfortunately, it is out-of-date
- We will focus more on modern technologies and dump some old stuff

Course Outcomes 1/2

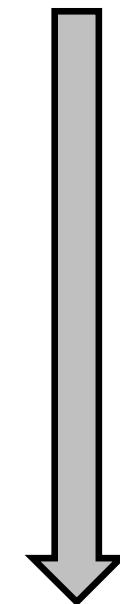
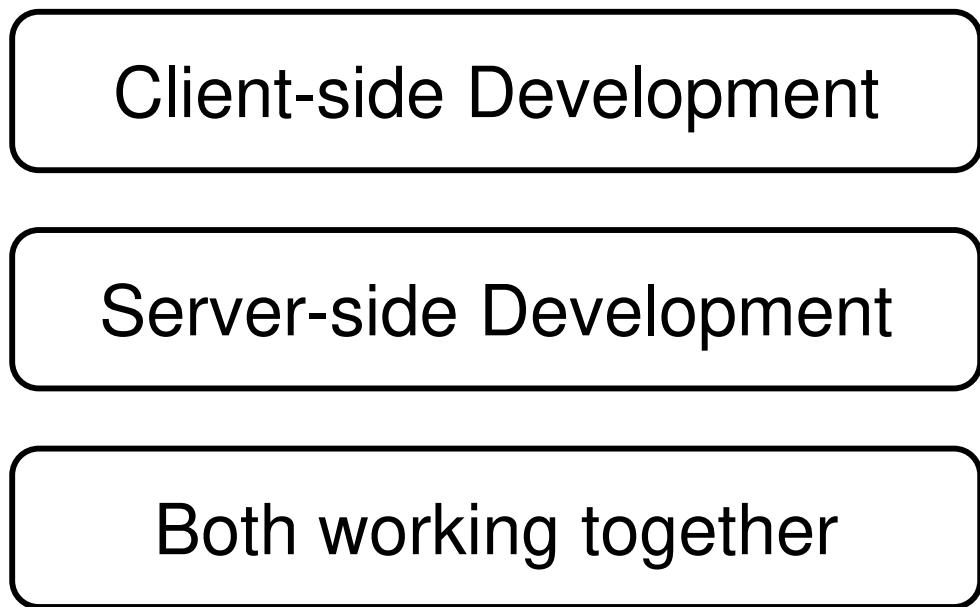
- Similar to the description, the course outcomes do not reflect what we will do on the course:
- At the completion of this course students will be able to:
 1. Appreciate the impact of Internet on society.
 2. Assess HTML and related display techniques including CSS.
 3. Build browser-based programs using the JavaScript language, including DHTML and event handling.
 4. Program advanced browser display technologies including SVG, and differentiate between the technologies.

Course Outcomes 2/2

5. Develop code for handling communication between web page components such as JavaScript.
6. Install and describe the operation of a server such as Apache and develop server side code in an appropriate language such as PHP.
7. Identify the most common HTTP instructions and their methods of client-server interaction, including cookies.
8. Identify XML and related technologies including DOM handling.
9. Develop complex programs for browser-server communications, including use of Ajax.

Course Outline

- The course is roughly divided into these three components:



We will roughly work in this order during the semester

People

- Course Instructor
 - Gibson LAM
 - Email: gibson@cse.ust.hk
 - Office: Rm 3553
- Teaching Assistants
 - CHEUNG, Wing Ho
 - Email: gary.wh.cheung@connect.ust.hk
 - ZHANG, Chi
 - Email: cchangbt@connect.ust.hk
- The best way to contact us is via email



Weekly Teaching Schedule

- Lectures
 - Monday, 9:30-10:20am, Rm 4620 *or online*
 - Wednesday, 9:30-10:20am, Rm 4620 *or online*
- Labs
 - LA1 Thursday, 9:00-10:50am online
 - LA2 No scheduled meeting for this lab

(We will have the first lab in week 3)

How Do They Work?

- For lectures:
 - At least at the start of the semester, we will do the lectures on Zoom
- For labs:
 - Before the lab, *lab page* will be released on the website and *lab video* on canvas
 - The lab time then becomes TA consultation hours on Zoom

Course Web Site

- All course information is presented via the web at
<https://course.cse.ust.hk/comp4021/>
- You need to log on, using your CSD account details if you are off campus

☰ COMP4021 Internet Computing



canvas



Course Calendar

Week 1 4 Feb - 11 Feb

Lecture 1 - 7 Feb

Course Details [[B&W](#), [colour](#)]

- Please go [here](#) to register your CSD account if you do not have one (you may have to wait a few hours after joining the course before doing this)

 Zoom link [here](#)

Course Notes and Textbook

- All notes will be available in PDF format, accessible via the course web site
- The colour and black-and-white versions of the notes will be released, e.g.



Course Details [B&W, colour]

- On this course you use the latest web technologies so there is no textbook!
- You can find plenty of helpful resources on the web, e.g. <http://www.w3schools.com>, – but be careful, random web material can be out of date

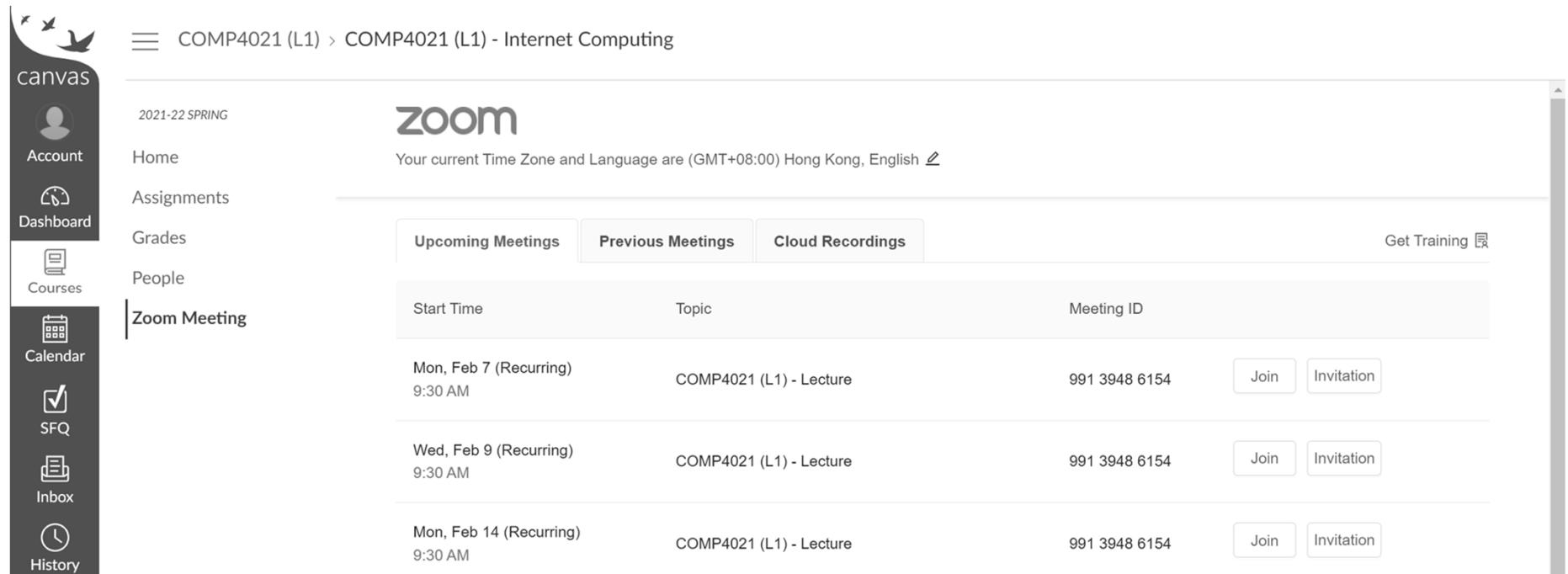
Course Canvas Page

- The course canvas page contains only some basic information of the course
- Course materials are put in the CSE course area
- However, we will use the canvas page for HW submission and, grade release

The screenshot shows the Canvas course page for COMP4021 (L1). The left sidebar has a dark theme with white icons and text. It includes links for Account, Dashboard, Courses, Calendar, SFQ, Inbox, History, and Help. The main content area is titled "COMP4021 (L1) - Internet Computing". It displays a message "Hello students!" and a link to the course website: <https://course.cse.ust.hk/comp4021>. Below the link, it says "(To be released before the first class)". There is also a note about applying for a CSD account and a link to the ITSC Student Guide for Zoom usage.

Zoom Meetings

- You can also find the Zoom meeting links from the canvas page



The screenshot shows the Canvas LMS interface for the course COMP4021 (L1) - Internet Computing. The left sidebar includes icons for Account, Dashboard, Courses, Calendar, SFQ, Inbox, and History. The main content area displays the Zoom integration, showing three upcoming meetings for the week:

Start Time	Topic	Meeting ID	Join	Invitation
Mon, Feb 7 (Recurring) 9:30 AM	COMP4021 (L1) - Lecture	991 3948 6154	Join	Invitation
Wed, Feb 9 (Recurring) 9:30 AM	COMP4021 (L1) - Lecture	991 3948 6154	Join	Invitation
Mon, Feb 14 (Recurring) 9:30 AM	COMP4021 (L1) - Lecture	991 3948 6154	Join	Invitation

- Alternatively, you can also get the Zoom meeting links from the course website

Lectures and Labs

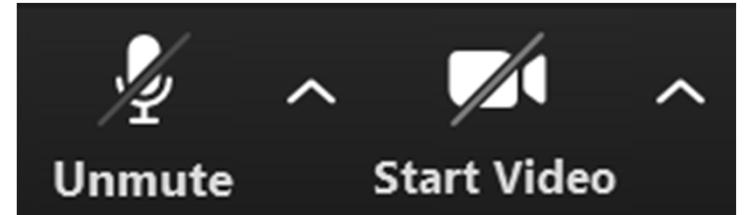
- The lectures give a strong coverage of the concepts with many examples and demos
 - I won't take attendance in the lectures
- Then the labs give you chance to practice what you have learned and help you take your understanding deeper
 - We won't take attendance in the labs
- Some of the labs will give you basic ideas on how to work on your project

Marks Distribution

- Lab work 30%
 - There will be tentatively 6 labs, where you need to hand-in 3 of them, i.e. $10\% \times 3 = 30\%$
 - This is individual work
- Mini project 30%
 - You will make a game involving client and server-side programming
 - This is a group project of 3 people max.
- Final 40%
 - This will take place in the final exam period, like most other final exams

Conduct During Zoom Sessions

- Your audio and video are both muted when you join a Zoom meeting of the course, please don't unmute the audio / video unless I ask you to
- Please don't abuse the chat room with private or silly messages
- Please don't put annotations on my screen unless you are told to do so



Cheating Policy

- If you get caught cheating, both you and the other person get zero for that work, and your end-of-semester grade is lowered one sub-grade i.e. a B grade becomes B-
- 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 We 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 Internet
- 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 work in the lab room you need to enable your CSD account

How to Enable Your CSD Account

- Don't wait for the lab time to do this
- Go to a computer in one of the barns at UST
- 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. At the top, the university's logo and name are displayed: "香港科技大學" (The Hong Kong University of Science and Technology). Below this, the text "HKUST Central Authentication Service" is centered. 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:", each with a corresponding text input box. To the right of the password field is a gray padlock icon, indicating security. Below the input fields is a checkbox labeled "Warn me before logging me into other sites." At the bottom left is a "LOGIN" button, and at the bottom right is a "clear" link.

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 setting service. At the top, there are input fields for 'CSD Account Name', 'New Password (8 chars or more)', and 'Retype Password'. Below these is a section titled 'Set the password of:' containing three checkboxes: 'Unix account at Faculty/PG domain' (unchecked), 'Unix account at UG domain' (checked), and 'PC account at domain CSD' (checked). At the bottom of the form are two buttons: 'Go UPDATE' and 'RESET FORM'.

3. Finally, click 'Go UPDATE'

1. Enter your ITSC account name and password (your CSD account name is the same as your ITSC account name)
2. Tick the bottom two check boxes ("Unix account at UG domain" and "PC account at domain CSD")

- You will see something like this:



- 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!