Computer Software

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In this lecture, we talk about computer software.
A computer software is basically a set of
instructions telling the computer what to do.
It is also known as computer programs.
Comparing to hardware, which you can touch and see,
software is intangible, that's
why it has the name software.
Without software, a computer is useless.
Just like a vehicle,
with no gasoline, you cannot run the vehicle.
Again, this is a diagram
showing the structure of a computer system.
At the bottom, we have the hardware,
at the top, we have users.
In between users and hardware, we have software.
We have application software and
system software in device drivers.
They are the software that we use to
drive hardware to do different task.
Nowadays, software is everywhere.
Microsoft Windows, which is
an operating system is a piece of software.
Photoshop, which you can use to
manipulate photos is another piece of software.
Google Docs is also a piece of software.
PowerPoint that we use to create
all this slides is another piece of software.
Computer software basically we can
classify them into three different types.
The system software, programming
software, and application software.
We will talk about them one by one.
So system software includes the operating system,
which governs all computer resources.
Device drivers, which control
all devices connected to the system.
Utilities, which maintain resources in the computer.
For example, creating a file or deleting a file.
More details of our system software
will be provided in the next lecture.
Programming software are software used
by programmers to create new software.
Programmers use it to design and develop
set of instructions for special purposes.
Basically, programmers use
human understandable source code or languages,
which will be translated or
compiled into machine codes by
programming software package called
Integrated Development Environment, IDE.
An example of IDE includes Microsoft Visual Studio,
Apple Xcode, and Eclipse.
These are some of the popular programming languages
that we use for creating programs.
For example, for developing executable programs we use C,
C++, Java, Visual Basic,
Python, Perl, or Ruby.
For developing dynamic websites or web applications,
we may use JavaScript or PHP.
Next, we talk about application software.
Basically, application software are closest to the users,
and it allows you to you fulfill
the purpose for which you actually buy the computer.
For example, social networking.
For example, using Facebook, playing games,
surfing the internet, working on assignments,
listening to music, or organizing your photos.
They all require different software
applications on your computer.
One type of application software,
we call it productivity software.
We use it to create documents,
spreadsheets, and presentations.
So for the popular productivity software,
it includes Microsoft Office,
which is still the most globally popular.
The LibreOffice, which is free of charge.
If you're using Mac,
then you may use the Apple iWork.
Software for document preparation,
they are commonly known as Word Processor.
Any it provides the what we
call the What You See Is What You
Get interface to edit and preview a document.
It also allows automatic formatting of a document.
For example, changing the styles, inserting header,
footer, and page numbers,
and creating table of contents etc.
It also allows document tracking for collaboration.
It tracks changes and
corrections from different users using different colors.
It also track the date and time for the corrections.
Common example for work processor
includes Microsoft Word,
LibreOffice Writer, and also the Google Docs.

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Another type of productivity software
is the Spreadsheet software.
It simulates a paper accounting worksheet
with a grid of cells.
It allows automatic calculation
of complex aggregation functions.
For example, summation, average, max, and mean.
It allows data filtering for easy viewing and sorting.
It also allows creation of different forms of charts.
For example, pie chart or bar chart.
Common examples include Microsoft Excel,
LibreOffice Calc, Google Documents, and Google Form.
Another type of productivity software

is software for preparing presentations.
It allows the creation of slideshow for presentation.
Usually, we are in overhead LCD projector.
So it allows easy editing of slides with visual aids.
For example, bullet points,
numbering of items, clip art,
images and videos, tables or charts,
and animations and transitions.
So common examples include Microsoft PowerPoint,
LibreOffice Impress, and Google documents.
Different software suites produce different file formats.
They are usually incompatible
between different suites or different worksheets.
The popular Microsoft Office has
two incompatible versions in use.
Office 2003 and before,
we're using one version,
and Office 2007 and after,
we are using another version.
You can see the difference
in the two versions from the file extensions.
Due to the incompatibility of different file formats,
confusion may arise in document exchange when you
exchange the documents with different users.
The solution is to use what we call
the Portable Document Format, the PDF.
PDF was created by a company called Adobe in 1993.
It's designed for printing and
the file itself represents
the printing view of a document.
It can include text in different languages,
various fonts, and images.
Normally, you cannot make changes to
a PDF file so it's good for document distribution.
It can be produced by most of the productivity software.
The most popular PDF viewing software is Adobe Reader.
So apart from
the productivity software for creating documents,
spreadsheets, and presentations, there are
also other productivity software for special purposes.
For example, Equation Editor, database manager,
desktop publisher, project manager, diagram,
and flowchart creator,
and also e-mail, and information manager.
They solve different special purposes.
So because of the popularity of the Internet,
the same set of productivity tools are
available based on the idea of Cloud computing.
So they are not as powerful as
the desktop version but at lower costs.
They provide better features on
collaboration and sharing of work and documents.
For example, version control.
So there's no confusion on file format compatibility.
Examples include Google Drive
and Microsoft Office in the Cloud.
So we also have what we call the Internet software
to enjoy different features of the Internet.
They include the web browser
to browse the Internet for example,
Internet Explorer,
the Mozilla Firefox, and Google Chrome.
We also have the e-mail clients for receiving
e-mails examples include
Outlook Express, Mozilla Thunderbird.
We also have software for
instant messaging for sample Skype,
Facebook messenger, and Wechat.
So with the abundant availability
of multimedia files today,
tools are available for
organizing and sharing your image files,
video files, and audio files.
For example, you can use Picasa
and Instagram for managing your photos,
you can use Windows Media Player
for your music and videos,
and you can use iTunes for your music files.
For more advanced multimedia production,
that means that you wanted to create or manipulate
your video files, your audio files,
and your image files,
you can use for example Photoshop,
Adobe Illustrator, or GIMP for manipulating your photos.
For animation and videos,
you can use Adobe Flash,
Adobe Premiere Pro, and MovieMaker.
For music, you can use Apple GarageBand or Audacity.
So software for games.
Let me say, you want to play video
games on your computer,
you can have game programs.
That means, that you have download and installed
the game programs on your computer
before you can actually play the game.
You can have emulator programs that allows you to
simulate another gaming console and run games on it.
You can also have browser games which you can play
directly from a website
without installing the game on your computer.
So online software, they're often called
web applications and they are
accessable over the Internet through web browsers.
For a good example is to Google search engine.
If you want to Google something,
you just open up your browser,
type in www.google.com, go to the website there,
and then use the service there.
The good thing about web applications is
that there is no installation required.
So we can use it on any machine
with Internet connection and browser.
So data are stored on the server site and
most of the calculations they're done on the server site.
Since most of the things are done on the server site,
the good thing about the web applications is that,
it requires low computing power on the client side.
So they are usually available at low or
even no cost because they're supported by advertisement.
But of course, in case since
you're putting things online,
there are always security and privacy concerns.
So portable software, they are on
more and more public computers
available in public places.
For example, libraries, coffee shops,
hotels, campus computer barns, et cetera.
Software installed on this public computers,
are usually limited and sometimes,
people may want to use their own customized set
of software on this public computers.
So to resolve the problem,
we have something called the portable software,
that can be stored in
a USB flash drive and can be used without installation.
So example of portable software
include Google Chrome portable and GIMP portable.
So a piece of software may not
suit the needs of everyone.
Some software allows installation of extensions or
plug-ins or toolbars for easy customization of features.
This is extremely popular
in web browsers for example, Google Chrome.
So people can develop extensions
for minor features that suit their own needs.
Examples include Adblock for Google Chrome.
This will block all the adds on the webpage,
resynthesis for GIMP and
Google Toolbar for more advanced searching.
So with the increasing popularity of smartphones,
I guess all we're using smartphones nowadays.
There is new type of software known as
apps on mobile platforms.
So they allowed you to do virtually anything on
your mobile phone and
the price are usually lower than the desktop version.
If you are using Android phone,
you can download your apps from Google Play,
If you are using iPhone,

then you can download your apps from Apple App Store.
So once you purchase an app,
basically belongs to your account and it can be
synchronized across several mobile platforms.
For example iPhone and iPad.
To streamline the user experience,
there are few options to be set which
may create some privacy and security issues,
especially when you're talking
about using your mobile-phone online.
When you put something online and there's
always some privacy or security issues.
Some of the apps, they may have
access to your address book, calendar,
notes, and some other information,
or private information that you
store on your mobile-phone.
So make sure that the apps are safe before you use them.
So for HKUST we have to mobile app call m.HKUST.
You can easily get it from Google Play or
App Store by searching for HKUST.
Using this app, you can get lots of of
important information about UST.
For example, you can get
the campus map from this app and you can
also get information about the courses
that you can take at UST from this app.
We may have specific purpose software for special users.
For example, we may use simulation software
for the Science and Engineering Community.
For financial institutions and banks,
they're using financial software.
We may also tailor-made software for different shops.
For example, a point of sale or
a POS software is
needed for taking care to business of a shop.
So we also have another type of software which is
called the malicious software or malware.
So for malware, is this the kind of
application software to the developer
of the malware? Yes, it is.
Because they serve different malicious intentions
and usually malware run without user's consent.
Malware usually brings undesirable results.
For example, the deletion of important data,
the misuse of computer resources,
and also the leak of private information.
So there are different types of malicious software.
The most common ones, are the viruses.
I guess most of you have heard about it.
They would infect some executable software on
your computer and by running
the infected executable software,
it will spread the virus to add
executable software which will make
your computer either useless or
delete some of the important files on your computer.
Another type is the Trojan horses.
They're usually bundled with
desirable software and they will cause
hidden damages at particular security holes
and they are really really difficult to detect.
The last type is the spyware.
From the name should know that,
spyware would gather information from
computer users for creator's profit.
Because there are too many malicious software,
so that's why we have the antivirus software
which will prevent,
detect, and remove malware.
It requires virus definition updates
frequently because new malware comes out
every day and the antivirus software vendor
will update virus definition frequently.
For HKUST member, there is
a free antivirus software
that you can download at this web page.
If you don't have an antivirus software on your computer,
I really recommend that you go to this web page,
download the software, install it, and then use it.