Information Everywhere

An Introduction to Web-based Information Systems

by Jeremy Scott

LEARNER NOTES
Acknowledgements

This resource was partially funded by a grant from Education Scotland. We are also grateful for the help and support provided by the following contributors:

George Heriot’s School
CompEdNet, Scottish Forum for Computing Science Teachers
Computing At School
Peter Donaldson
Charlie Love
Judith McColgan
David Proudfoot
Greg Reid
Computing at School
Council of Professors and Heads of Computing (CPHC)
Edinburgh Napier University School of Computing
Glasgow Caledonian University School of Engineering and Built Environment
Heriot-Watt University School of Mathematical and Computer Sciences
Robert Gordon University School of Computing
Scottish Informatics and Computer Science Alliance (SICSA)
University of Aberdeen Department of Computing
University of Dundee School of Computing
University of Edinburgh Informatics Forum
University of Glasgow School of Computing Science
University of St Andrews School of Computer Science
University of Stirling Department of Computing Science and Mathematics
University of Strathclyde Department of Computer and Information Sciences
University of the West of Scotland School of Computing
4J Studios
Brightsolid Group
Google
JP Morgan
Microsoft Research
Oracle
RunRev
Sword Ciboodle

The contribution of the following individuals who served on the RSE/BCS Project Advisory Group is also gratefully acknowledged:

Professor Sally Brown (chair), Mr David Bethune, Mr Ian Birrell, Professor Alan Bundy, Mr Paddy Burns, Dr Quintin Cutts, Ms Kate Farrell, Mr William Hardie, Mr Simon Humphreys, Professor Greg Michaelson, Dr Bill Mitchell, Ms Polly Purvis, Ms Jane Richardson and Ms Caroline Stuart.

Some of the images used within this resource have been reproduced under Creative Commons licence.

BCS is a registered charity: No 292786
The Royal Society of Edinburgh. Scotland's National Academy. Scottish Charity No. SC000470
# Contents

**Introduction** .......................................................................................................................... 1  
  What is Information? .................................................................................................................. 1  
  Real-World Information Systems .......................................................................................... 3  
  Information Systems ............................................................................................................... 5  
  Computerised Information Systems ...................................................................................... 6  
  Information vs. Data ................................................................................................................ 8  
  Structuring Information ......................................................................................................... 10  

**A Brief History of the Internet** ............................................................................................. 13  
  One Small Step For Technology .......................................................................................... 13  
  Linking Computers ................................................................................................................ 14  
  Linking Information .............................................................................................................. 14  
  Hypertext ............................................................................................................................... 14  

**The World Wide Web** ........................................................................................................ 15  
  The Internet ≠ the World Wide Web .................................................................................... 16  
  Current WWW developments .............................................................................................. 17  
  Web 2.0 ................................................................................................................................. 17  
  Web On The Go .................................................................................................................... 17  
  Future WWW developments ............................................................................................... 18  
  Web 3.0 (The Semantic Web) ............................................................................................. 18  
  The Internet of Things ......................................................................................................... 19  
  Big Data ............................................................................................................................... 20  
  Social, Legal and Ethical issues ............................................................................................. 22  

**WWW pages** ....................................................................................................................... 24  

**Creating a Website** ............................................................................................................ 27  
  Analysis ................................................................................................................................. 27  
  Design .................................................................................................................................. 29  
  Structure ............................................................................................................................... 29  
  Linear Structure ................................................................................................................... 30  
  Hierarchical (tree) Structure .............................................................................................. 31  
  Net Structure ....................................................................................................................... 32  
  Navigation ............................................................................................................................. 36  
  Screen Design ....................................................................................................................... 37  
  Implementation ..................................................................................................................... 39  

**Creating WWW Pages in HTML** ..................................................................................... 40  
  HTML: The Language of the Web ....................................................................................... 40  
  Learning HTML .................................................................................................................... 41
Introduction

What is Information?

Have you ever wondered what information is?

The world we live in contains objects (things). For example, I am working just now at a brown, rectangular desk which is approximately 1 metre high.

By describing the desk in this way, I have identified three of its properties (sometimes called attributes) – its colour, shape and height – and have provided facts that describe those properties. These facts are information.

So, information is simply facts about things!

When we identify an object’s properties, then we identify the things we think are important and relevant about it. We ignore properties we don’t think are important.

In the case of my desk, I could have recorded much more information – some of it relevant for some purposes, some not e.g.

- its manufacturer;
- distance from the door;
- whether it wobbles;
- where it was made;
- when it was made;
- the number of scratches visible on its surface;
- the thickness of the surface;
- its cost;
- etc.
Activity

a) Look around and write down three objects you can see.

b) Now write down three important properties about each object – try to keep each property to just one or two words.

c) Once you have done this, write down a short description (again, just one or two words) about each property.

If you find it easier, complete the “Description” column first and then decide what property the description relates to.

<table>
<thead>
<tr>
<th>a) Object</th>
<th>b) Property</th>
<th>c) Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Desk</td>
<td>shape</td>
<td>rectangular</td>
</tr>
<tr>
<td></td>
<td>colour</td>
<td>brown</td>
</tr>
<tr>
<td></td>
<td>height</td>
<td>1 metre</td>
</tr>
</tbody>
</table>

---

---
Real-World Information Systems

You will already have used an information system today without realising it. In fact, you have probably created some yourself!

For example, it is likely you can find an item fairly quickly in your bedroom – even if someone else couldn’t! To do this, you will have some kind of “filing system” in your head about where things are in your bedroom. You will have organised things according to what works for you e.g. clothes might be in a cupboard or drawers; different drawers might contain different clothes, etc.

Activity

Imagine that a friend is coming to borrow something from your bedroom e.g. a game, a book, an item of clothing, etc. Describe how to find the item in your bedroom starting from your bedroom door.

a) Item: __________________________________________________

b) How to find it: _____________________________

________________________________

________________________________

________________________________

________________________________

Activity

In the same way as above, describe to someone how to find a teaspoon in your kitchen, starting from the kitchen door. You might even assume that the person you are instructing has never seen a teaspoon before!

________________________________

________________________________

________________________________

________________________________

________________________________

________________________________
Getting Organised

People tend to organise objects according to their properties.

For example, in a kitchen, this is most likely based on what the object is used for i.e. its function – which is why in a typical kitchen:

- pots will be kept in one cupboard;
- dishes will be kept in another;
- cutlery will be kept in a drawer
  - separated into knives, forks, spoons, etc.;
- food will be kept in a cupboard or fridge
  - depending on whether it is perishable or not (yet another property).

The example above of the kitchen is an excellent example of a real-world information system – and just as we organise objects to make them easy to find, we must also organise information in order to make it easy to find.

Let’s now look at how information systems have been developed by humans over the years to help us do this...
Information Systems

Humans have recorded information for thousands of years. Technologies to record information have been around for a long time. From

- the first cave paintings;
- stone carvings;
- written papyrus;
- early books.

None of these technologies can really be called an information system, however. What makes an information system different is that the information is stored and organised in such a way as to make it easy to retrieve (get out).

1. Early information systems were paper- or card-based. Name or describe some below.

________________________________________
________________________________________
________________________________________
________________________________________

The Domesday Book was compiled in the time of William the Conqueror and completed in 1086. It was an early information system that catalogued how much land and livestock was held by every landowner in England – presumably to know how much tax each was due to pay the King.

2. Write down three problems you can think of when using paper- or card-based systems.

1. _______________________________________

2. _______________________________________

3. _______________________________________
Office workers in Baltimore, USA working with a non-computerised filing system in the 1940s.¹

Computerised Information Systems

Modern information systems began in the computer age (1940s onwards). Nowadays, an information system means a combination of computer hardware and software that is designed to:

- create
- store
- process and
- present information.

Information systems can be found everywhere – examples include:

- social networking sites such as Facebook and Twitter
- contact lists and call logs on a mobile phone
- playlists on your mobile phone or media player
- information stored about you by your school, doctor, SQA, etc.

¹ Image courtesy of New Deal Network http://newdeal.feri.org/
3. Show how the examples above meet the definition of an information system by giving examples of how each one lets you **create, store, process** and **present** information.

<table>
<thead>
<tr>
<th>Information System</th>
<th>Operation</th>
<th>Example of operation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Social networking site e.g. Twitter</strong></td>
<td>Create</td>
<td>Post a new tweet</td>
</tr>
<tr>
<td></td>
<td>Store</td>
<td>New tweet is stored on Twitter’s servers</td>
</tr>
<tr>
<td></td>
<td>Process</td>
<td>Tweets can be sorted by date, filtered by user, etc.</td>
</tr>
<tr>
<td></td>
<td>Present</td>
<td>Tweets can be shown individually or in a list</td>
</tr>
<tr>
<td><strong>Mobile phone contact list</strong></td>
<td>Create</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Store</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Process</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Present</td>
<td></td>
</tr>
<tr>
<td><strong>Media player playlist</strong></td>
<td>Create</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Store</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Process</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Present</td>
<td></td>
</tr>
<tr>
<td><strong>School pupil records system</strong></td>
<td>Create</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Store</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Process</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Present</td>
<td></td>
</tr>
</tbody>
</table>
Information vs. Data

Many people use the words data and information to mean the same thing, but they are not.

Data\(^2\) is raw, unprocessed facts and figures which are collected, stored and processed by computers. Data is encoded information.

Information is what we get when data is processed. Information is the meaning that humans give to data.

For example, the digits 251201 are data. Depending on what they represent, they could mean the following items of information:

- a date: 25 December 2001
- a sum of money: £251,201 or £2,512.01
- a student ID number: 251201
- a bank’s sort code: 25-12-01
- a map reference

4. Look at the following data and write down three possible pieces of information they could represent:

a) SL62TBO

b) 170299

---

\( ^2 \) Strictly speaking, the word “data” is a plural, so it should be “Data are...” (the singular “datum” means one item of data). However, most people now refer to data as singular e.g. “The data is...”
5. Now let’s do this the other way round.
Write down three different ways of representing the following information:

a) Your name
   i)  
   ii)  
   iii)  

b) Your date of birth
   i)  
   ii)  
   iii)  

c) Your address
   i)  
   ii)  
   iii)  

Structuring Information

In order to be able to work effectively with information, it has to be **structured** (organised).

If you have studied databases, you will know that a database is a collection of similar information that is structured into **files**, **records** and **fields**.

- Each item or category of information is called a **field**.
- All the fields about one person or thing make up a **record**
- A collection of records is called a **file** (or **table**).

An example of a simple card-based database is shown below....

![Database diagram](image)

A **file** is made up of records. There are eight records in this database.

A **record** is all the information about one person or thing.

A **field** is an item/category of information on a record. In the example above, there are three fields.

All records in a database have the same field **names** – in the example above, we have **Name**, **Address** and **Phone** – , but the **contents** of each field can vary from record to record.
The same information could also be displayed in a grid/table view:

This database has three **fields**. The field **names** are **Name**, **Address** and **Phone**. The field **contents** change from record to record.

<table>
<thead>
<tr>
<th>Name</th>
<th>Address</th>
<th>Phone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ada Lovelace</td>
<td>Kirkby Hall Mallory Leicestershire</td>
<td>01815-185236</td>
</tr>
<tr>
<td>Charles Babbage</td>
<td>44 Crosby Row Walworth Road London</td>
<td>01791-187179</td>
</tr>
<tr>
<td>Alan M Turing</td>
<td>Hut 8 Bletchley Park Milton Keynes MK3 6EB</td>
<td>01912-195441</td>
</tr>
</tbody>
</table>

6. Which is each of the following: a **file**, **record** or **field**?

   a) A Tweet __________________________________________
   
   b) Someone’s status on a Facebook profile ______________________
   
   c) A Facebook posting ________________________________
   
   d) A Wikipedia page _________________________________
   
   e) All the entries in Wikipedia: _______________________

7. Using the example of a telephone directory, what would make up a

   a) field? __________________________________________
   
   b) record? __________________________________________
   
   c) file? ____________________________________________
8. a) In the telephone directory example above, what is it that makes it easy to find a number in a telephone directory?

______________________________________________________________

b) What would happen if this was not the case?

______________________________________________________________

9. Some time ago, information systems began to move on-line. What benefit(s) come from accessing an information system over the Internet?

______________________________________________________________

______________________________________________________________

______________________________________________________________

Activity

Examine some on-line databases, and try to identify files/records/fields from each one. Examples you might look at include:

a) Internet Movie Database (IMDb)

File: __________________________________________________________

Record: _________________________________________________________

Field: __________________________________________________________

b) Chambers 21\textsuperscript{st} Century Dictionary

File: __________________________________________________________

Record: _________________________________________________________

Field: __________________________________________________________

This resource will not explore databases, but it is important to know that the information in most large scale on-line information systems is stored using databases.
A Brief History of the Internet

In this course you will develop your own information system. The setting for this will be the World Wide Web – itself a huge information system. First, let’s explore the development of the technology that enabled this to happen...

One Small Step For Technology

The 1960s was a time of great change, both socially and technologically. In the final year of that decade, three huge technological achievements occurred:

• The maiden flight of Concorde
  A joint venture between Britain and France, Concorde was the world’s first supersonic passenger jet. It had its first test flight on 2nd March, 1969.

• The moon landings
  On 20th July 1969, Neil Armstrong became the first human to walk on another world. Climbing out of the Apollo 11 capsule onto the surface of the moon, Armstrong said that it was “one small step for man…one giant leap for mankind”.
  Unknown to most people, another small step/giant leap was taking place...

• ARPANET
  On 29th October 1969, Charles Kline, a student programmer at University of California Los Angeles (UCLA) sent the first message on a network between computers. This network had been created with the assistance of the US Department of Defense’s Advanced Research Projects Agency (ARPA) and was therefore called ARPANET. Years later, ARPANET would evolve into the Internet of today.

3 It is claimed that in the excitement of stepping onto the moon, Neil Armstrong “fluffed” his lines. It is alleged he meant to say “That’s one small step for a man, one giant leap for mankind”. Whilst this certainly makes more sense (so may be true), history has already forgiven him!

4 Contrary to popular belief, ARPANET was not built to enable communications in the event of a nuclear war.
Linking Computers

A network can be defined as **two or more computers connected so that they can exchange data**. This data can be any kind – not just text-based messages – so commands can be sent that allow control of computers from a distance, for example.

During the 1970s, ARPANET/The Internet grew at an enormous rate. In addition to more computers being linked up, data transfer rates increased so that text and numbers could be transmitted in a reasonable time. As data transfer speeds increased this was followed by pictures, sounds and video (which take up more storage and therefore network capacity than text and numbers) in the 1990s and 2000s.

The Internet is more correctly described as an internetwork – a network of networks.

Linking Information

During the 1930s and 40s, an American scientist called Vannevar Bush proposed a machine for storing information. Called the Memex, it would allow the user to follow links within the information at high speed.

This was before the invention of electronic computers and the technology of the time didn’t permit Bush to develop his ideas further. However, Bush’s work inspired the next generation who did have access to computers.

Hypertext

In the 1960s, computing scientists began to develop programs that could store pages of text in which words could be used to link to related pages. These systems were called hypertext and were developed further during the 1970s and 80s.

In 1987 Apple released HyperCard, a programming environment that allowed developers to link information stored in “stacks” of on-screen “cards” that combined text, images and sound⁵. HyperCard is now considered to be a forerunner to the World Wide Web.

⁵ An early advertising slogan for HyperCard was “The human mind works by association. So why don’t computers?”
The World Wide Web

In 1989, British-born scientist Tim Berners-Lee was working at CERN⁶. His job required him to read lots of scientific papers and reports, often using the Internet to connect to a computer on which the information was stored – only to find that he needed to log off then log on to another one to find related information.

In 1989, Berners-Lee proposed a system whereby documents stored on any computer on the Internet could be linked using hypertext.

By 1991, Berners-Lee had created the system and coined the term a “world wide web of information”. The World Wide Web (‘WWW’ or simply ‘Web’) had been born and by combining two existing technologies in this way, Berners-Lee had started a revolution that would change the world.

Since then, the WWW has grown at an enormous rate, and is now one of the main means of doing business and providing information in the developed world. It has even been described as the most important invention since the printing press.

Berners-Lee did not patent his idea and, apart from various awards (and a knighthood), he has not profited from it. In 2012, Sir Tim took part in the opening ceremony of the London Olympics as an example of Britain’s contribution to technology.

“THIS IS FOR EVERYONE”
Sir Tim Berners-Lee’s Tweet at the opening ceremony of the 2012 Summer Olympics. It underlines his philosophy of free sharing of information that sparked his invention of the WWW.

---

⁶ CERN is a research laboratory near Geneva in Switzerland. It currently houses the Large Hadron Collider – a massive underground particle accelerator used in Physics experiments.
The Internet ≠ the World Wide Web

It is important to understand that The Internet and the World Wide Web are not the same thing.

The Internet is the name given to the network (or, more correctly, interconnected networks). The World Wide Web is the name given to the billions of pages of linked information that are stored on computers on the Internet.\(^7\)

It can be helpful to think of the Internet being like roads that connect places, with the WWW being like a type of traffic that travels on the roads such as cars. Just as there are other kinds of traffic on roads – lorries, buses, motorcycles, etc. – there are other kinds of traffic on the Internet, such as email or video chat.

**Activity**

Do you think that the WWW is the most important invention since the printing press? Explain your answer.

_________________________________________________________________________

_________________________________________________________________________

_________________________________________________________________________

_________________________________________________________________________

_________________________________________________________________________

_________________________________________________________________________

_________________________________________________________________________

_________________________________________________________________________

_________________________________________________________________________

_________________________________________________________________________

_________________________________________________________________________

_________________________________________________________________________

_________________________________________________________________________

_________________________________________________________________________

_________________________________________________________________________

_________________________________________________________________________

_________________________________________________________________________

\(^7\) Tim Berners-Lee still has to correct people who say he is “the man who invented the Internet”!
Current WWW developments

When the WWW was first developed, it was not the rich, multimedia experience that we know today. Web pages consisted mainly of text with limited graphics. The user could not interact with pages, so there was not much to do, apart from browse information.

The Web was also seen as something that only a few people would use and wasn’t intended to be a commercial thing. The author of these materials can recall following a debate on whether advertising should be allowed on the early Web!

Web 2.0

The Web is now a much “richer” environment and Web 2.0 is the name given to the latest generation of web sites that:

- offer interactive features;
- you can customise to your needs, offering a personalised experience;
- you can contribute your own content to, such as YouTube and Wikipedia.

Web On The Go

The devices that we use to access information on the web are also changing. In addition to computers, we can access web pages on mobile and smart devices such as phones, tablets and TVs.

These devices often use dedicated apps to present the information to us in a way that is best-suited to the particular device.

1. Give three examples of an information system that you may access using a smart device such as a web-enabled TV, set-top box or games console.

   a) ____________________________________________________________

   b) ____________________________________________________________

   c) ____________________________________________________________

The web has also become much more social. Information systems such as Facebook and Twitter allow us to keep in touch with friends, follow celebrities and have the very latest information fed to us directly.

---

The ability for users to create and edit articles themselves has led to the idea that Wikipedia is not a reliable source of information. Whilst there have been some notable cases of people getting caught out by inaccurate information, two separate studies by respected scientific publications have found Wikipedia to be accurate, in-depth and reliable.
Future WWW developments

It is interesting to speculate about what the Internet and the WWW might bring over the next few years.

Surprising as though it may seem, the WWW is still a relatively new technology. At the time of writing, web browsers had been available for about 20 years. This may seem like a long time, but think of the stage that other inventions had got to after 20 years of development (see below).

Some 20 year old technologies

![An 1896 telephone](image1) ![A 1919 Ford Model T](image2) ![A 1964 computer](image3)

Web 3.0 (The Semantic Web)

One of the areas of current WWW research (being led by, amongst others, Tim Berners-Lee) is becoming known as Web 3.0 or “The Semantic Web”.

“Semantic” refers to meaning, so the next generation of the web sites will contain additional data (called metadata⁹). This data is hidden from the user but can be interpreted by machines.

Computers and other devices will use this data to perform the tedious work involved in finding, combining, and acting upon information on the web. As with Web 2.0, Web 3.0 will not be an overnight upgrade of the WWW, but a gradual evolution of the next generation of web sites.

---

⁹ The word meta is often used to mean “about”, so metadata is simply data about the data stored in the system.
The Internet of Things

It is likely that most future devices will be smart and internet-connected, leading to “The Internet of Things”. Cheap electronic tagging of goods and artificial intelligence built into every household and industrial device will see us living in a massively interconnected world where people, objects and information are all tracked and locatable on the Internet.

This is already starting to happen (see opposite) and new devices will see it gather pace. By 2020, computer company HP predicts that there will be approximately one trillion (one million, million) sensors sending data across the Internet from connected devices such as cars, buildings, vending machines and heart monitors.

Radio Frequency Identification (RFID) tags are commonplace on goods. They contain a microchip that can communicate with a reader to transmit information.  

Above: An RFID tag used to identify a sheep. Above, right: An RFID device next to a grain of rice. The USA’s Food and Drug Administration has already approved the use of RFID chips in humans.
Big Data

In 2010 Google chief executive Eric Schmidt noted that the amount of data collected since the dawn of humanity until 2003 was the equivalent to the volume we now produce every two days. Since then, this figure has increased further and the amount of data we create is currently doubling every 18 months\(^\text{10}\).

This data comes from a variety of sources: posts to social media sites; mobile phone signals; purchase transactions – as well as from the Internet of Things (above). Such massive collections of data have become known as **big data**.

Here are some interesting statistics\(^\text{11}\) about big data:

- Each engine of a jet on a flight from London to New York generates 10TB of data every 30 minutes.
- In 2013, Internet data (mostly user-contributed) will account for 1 zettabyte\(^\text{12}\).
- Open weather data collected by the National Oceanic and Atmospheric Association has an annual estimated value of $10bn.
- Every day we create 2.5 quintillion bytes of data.
- 90% of the data in the world today has been created in the past two years.
- Every minute 100,000 tweets are sent globally.
- Google receives two million search requests every minute.

\(^{10}\) Source: Computerworld

\(^{11}\) Source: BBC News

\(^{12}\) 1 zettabyte = 1 trillion gigabytes (1,000,000,000,000,000,000 bytes)
Storing and processing big data creates many technological challenges, but it is what such large scale information systems can reveal that is most interesting. Examples include:

- The Massachusetts Institute of Technology (MIT) has teamed up with the Singapore government to use big data in various public projects. One example is the use of weather data to guide taxi drivers to where it is about to rain!
- Netflix is the largest commercial streaming video company in the USA. It stores details of what its 29 million users watch, when they're watching, where they're watching and what device they're using. It stores data on when users rewind or fast-forward, pause and stop watching a show or movie altogether.
- Ancestry.com helps people researching their family history. It keeps more than 11 billion records, resulting in 4 petabytes\(^{14}\) of content—historical records, birth records, death records, war and immigration records, even yearbooks—often in handwritten format. All of this data is searchable. Ancestry.com is also generating big data using DNA processing to help customers make connections. With some saliva in a tube, it can sequence a client's DNA and match them with other people in its database, like distantly removed cousins.
- Mount Sinai Medical Center, a leading teaching and research hospital in the USA is using big data to analyse the DNA of E. coli bacteria. E. coli, which comes in over 1 million different types, affects millions of people worldwide every year.

**Activity**

In small groups, research some examples of how big data is being used. Once you have done this, try to come up with your own ideas for how big data could be used.

\(^{13}\) Source: Computerworld

\(^{14}\) 1 petabyte = 1 million gigabytes (1,000,000,000,000,000 bytes)
Social, Legal and Ethical issues

Information systems are developing at pace. In a world where:

- every social network posting you ever make is recorded;
- every movement you make can be tracked;
- people wear devices such as Internet-connected glasses that can access (and upload) video footage and other data directly from online information systems

do we have much privacy left?

Several commentators have suggested that we are sleepwalking our way into a 1984-style scenario, where governments or big businesses can monitor your entire life.

Investigate one or more of the following people or developments in Information Systems and write a short paragraph about it.

Ted Nelson, Doug Englebart, Bill Atkinson, Tim Berners-Lee, Sergey Brin & Larry Page, Robert Cailliau, Apple Macintosh, iPhone, iPad, Mozilla, W3C, Oracle, Google, Facebook, Twitter, Google Glass
Activity

In 1999, computer executive Scott McNealy was asked how developments in information systems might affect peoples’ privacy. McNealy was famously quoted as saying “You have zero privacy anyway. Get over it!”

Was Scott McNealy right and is it something that should concern us?

Write a paragraph below reflecting your thoughts on Scott McNealy’s statement. You may want to consider arguments for and against such information systems.

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________
WWW pages

The WWW is simply a huge collection of pages of information which are linked to each other using hyperlinks. These pages are stored on computers called web servers and can be accessed by other computers using a web browser program such as Internet Explorer.

By clicking on a hyperlink (a linked word or picture), a user can be taken to another page of information. This page may be on a different web server on the other side of the world, without the user knowing!

Web Sites

A group of related web pages owned and managed by an individual or organisation is called a web site. A web site normally contains a home page, which is the first document users see when they enter the site. The site might also contain additional documents and files.

Each web page is typically stored as a separate file on a web server – each with its own unique address called its URL (Uniform Resource Locator).

A URL looks like the following:

```
http://www.royalsoced.org.uk/computingscience/infosys.html
```

- **http://** stands for hypertext transfer protocol. A protocol is an agreement between computers on how the information will be transmitted.


- **royalsoced** the domain – that is the registered web name of the organisation whose web site it is. In this case, it is the web site of The Royal Society of Edinburgh – Scotland’s national academy of art and science – the creator of this resource.

- **org.uk** the suffix which tells us what kind of site it is. In this case .org means a non-profit making organisation such as a charity or other body.

- **/computingscience/** a folder in the web site where web documents about Computing Science are stored.

- **infosys.html** a file called “infosys.html” (the default home page of a website is usually called “index.html”).

---

15 Tim Berners-Lee has since admitted that the “www” at the start of most URLs is actually unnecessary. He added that “it seemed like a good idea at the time”!
Activity

Use the web to find out what these suffixes are short for and give an example of each one. When you have finished, find out another one for yourself.

<table>
<thead>
<tr>
<th>Suffix</th>
<th>Type of domain</th>
<th>Country</th>
</tr>
</thead>
<tbody>
<tr>
<td>.co.uk</td>
<td>Commercial (business)</td>
<td>United Kingdom</td>
</tr>
<tr>
<td>.com</td>
<td></td>
<td></td>
</tr>
<tr>
<td>.ac.uk</td>
<td></td>
<td></td>
</tr>
<tr>
<td>.de</td>
<td></td>
<td></td>
</tr>
<tr>
<td>.ch</td>
<td></td>
<td></td>
</tr>
<tr>
<td>.gov.uk</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Inside and Out

A hyperlink can be internal or external – that is, it will point to a URL within the current site (internal hyperlink) or outside the current site (external hyperlink).

An internal hyperlink will normally just include the filename of the web page being linked to e.g.

```html
<a href="reduce.html">
```

whereas an external hyperlink will include the entire address of the web page being linked to e.g.

```html
```

As a general rule, pages linked using internal hyperlinks are under the developer’s control, whereas those linked using external hyperlinks are under someone else’s control.

What problems do you think might arise from using external hyperlinks in a website?

____________________________________________________________________________________________________________________________________________________

____________________________________________________________________________________________________________________________________________________

____________________________________________________________________________________________________________________________________________________
Web Browsers

In order to view web pages, you need a web browser. This is software that translates the HTML and other code contained in a web page and draws it out on screen. This makes a web browser a kind of program interpreter.

Some common web browsers are shown below.

Apple Safari  Google Chrome  Microsoft Internet Explorer  Mozilla Firefox  Opera

Different web browsers can display (render) HTML pages slightly differently. It is therefore important to test web pages on all the main web browsers.

**Activity**

Try visiting some web pages and compare how they look in different web browsers. Note any differences between them (no matter how small).

WWW page

Web browser 1

Web browser 2

Difference between how the pages appear

WWW page

Web browser 1

Web browser 2

Difference between how the pages appear
Creating a Website

Regardless of the tool you use to create a website, you cannot just begin to create pages without thinking carefully about what you are trying to achieve and how best to achieve it. Remember, your website is an information system that you will use to create, store, process and present information.

Analysis

This is the first stage of website creation and there are four main aspects:

- **Purpose**
  Why are you making the information system/site?
- **Target Audience**
  Who is going to use your site?
- **Content**
  What information will be on your site?
- **Function**
  How will the site be used?

You can easily remember these as the four Ws – why, who, what and how

Example: Suppose you want to make a website to promote recycling in your school/community?

**Purpose**: why has the site been created?
_In order to promote recycling in your school/community; to show fellow pupils easy ways to minimise waste and care for their environment._

**Target Audience**: who is it aimed at?
_Members of your school community._

**Content**: what information is on the site?
_Information about why we should reduce waste and easy ways to do it. This will include text and images, and possibly video and audio._

**Function**: how is the site used?
_Will the user just browse the information? Will there be links to other sites? Will the site be searchable?_

---

16 Okay, that last one is more of an H...!
Activity

Select two different websites and assess them in terms of the four Ws. Try to choose websites that are clearly aimed at different target audiences.

Website 1: __________________________________________________________

Purpose: why has the site been created? __________________________________

Target Audience: who is it aimed at? ______________________________________

Content: what information is on the site? _________________________________

Function: how is the site used? __________________________________________

Website 2: __________________________________________________________

Purpose: why has the site been created? __________________________________

Target Audience: who is it aimed at? ______________________________________

Content: what information is on the site? _________________________________

Function: how is the site used? __________________________________________

Once you have addressed the four Ws, it is time to start to gather the information for your website. This may be:

- text
- images
- other media (video, audio, etc.)
Design

Design makes the difference between a successful website and one which attracts few visitors. However, the main goal of design is to make a site easy to use and navigate, rather than simply attractive.

There are two main aspects of design:

- **structure** (or site map)
- **screen designs**

Structure

Think about some of your favourite websites. What do they have in common?

Chances are they make it easy for users to find the information they are seeking. This means that the site will be organised in such a way as to make it easy to navigate. The arrangement of pages on a web site is known as its **structure**.

No matter what information system you are using – a web site, a computer database, a booking system – the information will be structured. That is, the information will be organised in such a way as to make it easy to access.
Linear Structure

In a linear structure, the pages are linked, one after another. This type of structure gives the developer complete control over how the information is accessed and in what order, but very little control to the user. A linear structure might be a suitable structure for a photo slide show, for example.

Activity

Give an example from real life where information is organised in a linear structure.

________________________________

Give an example of an information system where the information is organised in a linear structure.

________________________________

Write down one advantage and one disadvantage of using a linear structure in an information system.

Advantage __________________________________________

Disadvantage __________________________________________
Hierarchical (tree) Structure

By far the commonest structure in web site design is the tree. This type of structure is known as hierarchical – just like folders within folders on your computer. This is a common model in many information systems, featuring a home page with pages linking from it.

A possible site map for our website is shown below:

In this example, a home page (level 0) contains links for the three main areas: Reduce, Reuse and Recycle (Level 1). Each link will lead to a page on that topic (level 2).

Each of those three pages has links to the next level and so on. This can be repeated as often as necessary.

**Activity**

Give an example from real life where information is organised in a tree structure.

________________________________
________________________________
________________________________

Give an example of an information system where information is organised in a tree structure.

________________________________

Write down one advantage and one disadvantage of using a tree structure in an information system.

Advantage ________________________________________________

Disadvantage ________________________________________________
Net Structure

In this structure, users can navigate freely by tracing one point (node) to another, changing route where necessary. The WWW itself is a net structure.

Activity

Give an example from real life of where you might find information organised in a net structure.

____________________________________________________________________________________

Give an example of an information system where the information is organised in a net structure.

____________________________________________________________________________________

Write down one advantage and one disadvantage of using a net structure in an information system.

Advantage __________________________________________________________________________

Disadvantage ________________________________________________________________________
Activity  

Look at the following websites and draw a basic site map for each one (just stick to the main navigation links).

Once you have done this, use the site map to identify which structure it is using.

http://www.nms.ac.uk/

Structure used: ____________________________________________________________

http://www.apple.com/

Structure used: ____________________________________________________________
http://www.tnmoc.org/

Structure used: ________________________________

Your own school’s website – http:// ________________________________

Structure used: ________________________________
Consider the URL that we looked at previously:

http://www.royalsoced.org.uk/computingscience/infosys.html

What structure do you think is being used in this site? ______________________________

Explain your answer ________________________________ ______________________________

Lastly, take a look at the following sites and try to decide what structure they use:

Wikipedia: ___________________________________________

Explain your answer: ______________________________________

_____________________________________________________

Google: ___________________________________________

Explain your answer: ______________________________________

_____________________________________________________

As you can see, sites do not always follow the accepted “rules” of web design!
Navigation

A common tool to help users navigate a website is the navigation bar. A navigation bar may be just text-based\(^\text{17}\) :

\[
\begin{array}{ccc}
\text{Reduce} & | & \text{Reuse} & | & \text{Recycle} \\
\hline
\text{Clothes} & | & \text{Packaging} \\
\end{array}
\]

or it may be graphical, with images acting as links.

A navigation bar will often be presented as a horizontal or vertical grid...

\[
\begin{array}{|c|c|c|}
\hline
\text{Reduce} & \text{Reuse} & \text{Recycle} \\
\hline
\text{Clothes} & \text{Packaging} & \\
\hline
\end{array}
\]

...and it will often be hierarchical (reflecting a tree structure), as shown above and left. In these examples, Clothes and Packaging are sub-sections of the overall Reuse category.

Some sites may also combine both a horizontal and a vertical navigation bar – main sections in one bar, with sub-sections in the other.

What is the advantage to users of having a navigation bar on a website?

____________________________________________________________________________________

____________________________________________________________________________________

____________________________________________________________________________________

\(^\text{17}\) The | ("pipe") character can be a simple but effective way to separate items of text in a navigation bar.
Screen Design

As well as structuring the site, it is important to structure the data on individual screens. Pages on a web site will usually have a **consistent layout**.

Why do you think this is?

When designing screens, web designers will create a sketch of the main elements (known as a **wireframe**).

A wireframe can be thought of as a template for the site’s pages: pictures can be represented by a crossed box; main headings will also usually be shown, with lines to represent text. A wireframe may also indicate general colour schemes, but will not be too detailed at this stage.

Most sites use a grid structure on web pages, often using a 3 or 4-column layout, and a sample wireframe is shown below:
Basic rules for screen design

In summary, a well-designed website will have the following features:

1. **Easy to navigate**
   - The structure should be clear to users
   - A navigation bar is not essential, but it helps
   - Hyperlinks should be obvious

2. **Easy to read**
   - Text should be clear and stand out against the background
   - Use short sentences
   - Language is appropriate for target audience

3. **Clear layout**
   - Use a grid structure, with the most important elements at the top
   - Use bright, distracting colours sparingly
   - Use a consistent layout across all your pages
Implementation

The first websites were coded in HTML.

As time passed, authoring packages were developed that allow the user to drag and drop elements to create web pages with no knowledge of HTML. Examples include Microsoft FrontPage and Adobe Dreamweaver. Other packages such as Microsoft Word and PowerPoint have the facility to save documents as web pages.

However, we will be coding pages in HTML! This will give you an understanding of what a web page is – a kind of program containing instructions for your web browser on how to draw out the page. In this respect, it complements the work covered in Software Development, as HTML is a programming language. It also provides very precise control over every aspect of how the web page should look.

Oh, and it’s fun!
Creating WWW Pages in HTML

HTML: The Language of the Web

If you look at the source of a web page, you will see that it contains computer code. This code is based around HTML (HyperText Markup Language) – the coding language developed for web pages. All web pages are based on this language (although they may contain code in other languages, too).

HTML is quite easy to learn and you do not need any specialist software to create it. All modern PCs have the facilities to create basic web pages.

HTML5 is the most recent version of the language and contains commands for including audio, video and animation on a web page, as well as text and graphics.

Activity

Use Mozilla’s X-Ray Goggles to “peek” at the HTML elements of a web page.

Mozilla’s X-Ray Goggles (http://hackasaurus.org/en-US/goggles/) lets you “peek” inside a web page to see the code for each element on the page.

---

View→Source in Microsoft Internet Explorer or Tools→Web Developer→Page Source in Mozilla Firefox.
Learning HTML

You are now going to learn how to create web pages in HTML code. Your teacher will direct you to an online tutorial which will take you through the process (it may or may not be one of those shown below).

At certain points, your teacher will direct you to some questions that follow in this section that will help to check if you have understood what you have learned.
Did You Understand?

Look at the following piece of HTML code and answer the questions that follow.

```html
<!DOCTYPE html>
<!-- Written by pupils of RSE High School -->
<html lang="en">
<head>
<title>Welcome to RSE High School</title>
</head>
<body bgcolour=white>
<!-- -->
<p style="color:green; font-family:verdana; font-size:20px; text-align:centre;">
<a href="reduce.html">Reduce</a> | 
<a href="reuse.html">Reuse</a> | 
<a href="recycle.html">Recycle</a>
</p>
<p align=centre><img src="images/recycle.png"></p>
<h3 style="color:white; font-family:verdana; text-align:left;">Welcome</h3>
<p>Last month, <a href=http://www.rsehighschool.com/>RSE High School</a> was awarded a prestigious
<strong>Green School Award</strong> for its work in promoting a cleaner environment!
This included:
<ul>
<li>keeping the playground litter-free <em>at all times</em></li>
<li>recycling all bottles, cans and paper</li>
<li>promoting walking and cycling to school</li>
</ul>
</p>
</body>
</html>
```
1. What is the purpose of the code on line 1? _________________________________

________________________________

2. What is the purpose of the code on line 2? _________________________________

________________________________

3. When the developer previews the site in a browser, the page does not seem to have a banner headline saying “Welcome to RSE High School”, despite this appearing in the <title> tag.

   Explain why _________________________________

   _________________________________________

4. Rewrite line 12 so that it explains the lines of code which follow it.

   _________________________________________

   _________________________________________

5. Lines 13-21 do not appear in the centre of the page as the developer expected. Why?

   _________________________________________

   _________________________________________

6. The word “Welcome” (line 25) does not appear when the web page is viewed. Explain why.

   _________________________________________

   _________________________________________

7. Would lines 27-31 appear on the same line or different lines when viewed in a web browser? Explain your answer.

   _________________________________________

   _________________________________________
8. How could the developer change the bulleted list on lines 33-35 to a numbered list?

________________________________

________________________________

9. How will the text shown on lines 34 and 35 look when viewed in a web browser?

________________________________

________________________________

10. The “pupils-recycling.jpg” image (line 38) does not appear when the web page is viewed in a browser. The developer has checked all spelling and location of the image file. Why is this?

________________________________

________________________________

11. When testing the website, the developer notices that the hyperlink on line 16 does not link to the reduce.html page. State two possible reasons for this.

a) ____________________________________________________________

b) ____________________________________________________________

12. Why has the developer put only the width tag on line 38 and not both width and height tags?

________________________________

________________________________
Project

Working in a pair or group, you are now going to **create a website of your own**!

You will develop this website in HTML. It may be that different members of your group will work on different aspects of the site, such as preparing text or media files, coding HTML, etc.

Alternatively, each member of the group could work on a separate page and they could all be brought together at the end. If you are doing this, think carefully about how you could ensure all the pages have a consistent layout.

You may have some ideas already, but websites are normally created in a series of stages:

1. Analyse
2. Design
3. Implement
4. Test
5. Document
6. Evaluate
7. Maintain

Or... **A Dance In The Dark Every Midnight!**

Now read on to see how these stages apply to your project...
Analyse

Working in pairs or small groups, brainstorm three ideas for your website. Think of how it might link in with other subject areas you’re studying.

1. ____________________________________________

   ____________________________________________

2. ____________________________________________

   ____________________________________________

3. ____________________________________________

   ____________________________________________

When you have decided on a topic, you may wish to look for inspiration from existing websites based on your idea.

Now discuss your ideas with your teacher.

Once you have agreed on your website, write down its four Ws below:

Purpose (Why are you making the information system/site?) _____________________________

   ____________________________________________

Target Audience (Who is going to use your site?) _____________________________

   ____________________________________________

Content (What information will be on your site?) _____________________________

   ____________________________________________

Function (How will the site be used?) _____________________________

   ____________________________________________
Design

There are two main aspects to designing a web site

- **structure** and
- **screen layout**

**Design (Structure)**

Decide on what kind of structure you will use. It may be useful to think of the main headings or sections you plan to include in your website, according to how the information or activities will be broken up.

What kind of structure have you chosen?

Explain why you have chosen this structure

Now design a **site map** of your website using your chosen structure (overleaf) /...
Site Map
Design (Screen)

Wireframe your web page(s):

- Think about how you will create a **consistent layout**. It might help to think of your pages in a grid layout\(^\text{19}\).

---

\(^{19}\) The “Rule of Thirds” is a basic aid used by artists and photographers to help compose pictures. It can be helpful for web designers to plan out web pages in a grid – often 3 x 3.
Implement

Now create your website in HTML!

- Prepare the text, graphics and other files you will need.  
  *Remember to give them sensible, short names. Remember also to respect copyright laws!*

- Then create the code.  
  *Make sure you have your designs in front of you!*
  
  *Appendix A and B contain a quick reference guide to HTML and web colours respectively. There are also several HTML reference sites that your teacher can point you towards.*

Document

Remember to put `<!-- comments -->` in your code. These should at the very least contain the name of the author and the date the code was written. You may also explain what key sections of HTML are doing.

Test

Test your website.

Let your classmates test it too and note their comments below.

**Good points:**

_________________________________________________________

_________________________________________________________

_________________________________________________________

**Bad points:**

_________________________________________________________

_________________________________________________________

_________________________________________________________
Describe problems that were found (by you or by testers) and how you fixed them:

Problem: ________________________________________________________________

Solution: __________________________________________________________________
________________________________________________________________________

Problem: ________________________________________________________________

Solution: __________________________________________________________________
________________________________________________________________________

Evaluate

How did the website turn out compared to how you originally planned it?
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

What mistakes did you make on the way?
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

If you were to start again from the beginning, what would you do differently?
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
Maintain

Let’s imagine you’re going to make a mobile-formatted version of your website, for viewing on a device such as a smartphone.

What changes would you make to it? State the reason(s) why.

<table>
<thead>
<tr>
<th>Change</th>
<th>Reason</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Change</th>
<th>Reason</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Congratulations!

You have now completed this course in web-based information systems design & development!

Remember that you can create HTML code at home, so there’s no need for this to be the end of your time as a web developer.

An Ancient Coder’s Proverb

One last thing: never forget the ancient coder’s proverb...

“Hours of coding can save minutes of design”

Think about it! ;-)
**Appendix A: Common HTML Tags**

<table>
<thead>
<tr>
<th>Tag</th>
<th>Explanation</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>&lt;!DOCTYPE html&gt;</strong></td>
<td>Tells the browser that this is an HTML document. The first tag on a page.</td>
<td></td>
</tr>
<tr>
<td><strong>&lt;html&gt;&lt;/html&gt;</strong></td>
<td>Tells the browser that what follows is written in HTML. The second tag on a page.</td>
<td></td>
</tr>
<tr>
<td><strong>&lt;head&gt;&lt;/head&gt;</strong></td>
<td>Stores information about the page, such as the title for the browser window.</td>
<td></td>
</tr>
<tr>
<td><strong>&lt;title&gt;&lt;/title&gt;</strong></td>
<td>Used inside the HEADing part to display text in the title bar or tab of the browser window</td>
<td>&lt;title&gt;My First Amazing Home Page&lt;/title&gt;</td>
</tr>
<tr>
<td><strong>&lt;body&gt;&lt;/body&gt;</strong></td>
<td>Where the content of your web page actually appears.</td>
<td>&lt;body&gt;Page content here...</td>
</tr>
</tbody>
</table>
| **<!-- -->** | Comment. Messages for other coders displayed in the code only (they don’t appear when the web page is viewed) | <!--Written by J Scott, 2013 -->

**PAGE AND WINDOW SETTINGS**

**WORKING WITH PARAGRAPHS**

- **<p></p>** Defines a paragraph. <p>This is some text in a very short paragraph</p>
- **<h1> to <h6>** Heading. Used to make titles stand out. <h1>Big heading</h1> <h6>Small heading</h6>
- **<br>** Stands for (line) break. Text is forced onto a new line. This text contains<br>a line break

**WORKING WITH TEXT**

- **<strong></strong>** Strong. Text in between tags appears bold. <strong>Bold text</strong>
- **<em></em>** Emphasised. Text in between tags is italicised. <em>Italic text</em>
- **<ul> </ul>** Unordered list – use with <li> tag to create a **bullet point** list
  - **<ol> </ol>** Ordered list – use with <li> tag to create a **numbered** list
  - **<li> </li>** List item, used inside <ul> or <ol>

**WORKING WITH LINKS & IMAGES**

- **<a href> </a>** Used to define a hyperlink. <a href="movie.html">Movie</a>
- **<img src>** Tells browser that there is a picture. <img src="funny face.jpg">
Appendix B: Cascading Style Sheet (CSS) Tags

CSS tags can be used inside <p> and <h> tags to style elements on a page:

- anywhere in the HTML of a page;
- in the <head> of a document to set the properties of all <p> and <h> tags within that document;
- as a different file stored with all pages in a site, to set the properties of all <p> and <h> tags in the entire web site.

<table>
<thead>
<tr>
<th>TAG</th>
<th>Explanation</th>
<th>Example(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>style=</td>
<td>Getting ready to set the style inside a tag</td>
<td>&lt;p style=&quot;text-align: left&quot;&gt;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>&lt;p style=&quot;text-align: right&quot;&gt;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>&lt;p style=&quot;text-align: center&quot;&gt;</td>
</tr>
<tr>
<td>text-align</td>
<td>Sets the alignment of text</td>
<td>Note US spelling of &quot;center&quot;</td>
</tr>
<tr>
<td>font-size</td>
<td>Sets the size of text (in pixels)</td>
<td>&lt;h1 style=&quot;font-size: 26px&quot;&gt;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>&lt;p style=&quot;font-size: 12px&quot;&gt;</td>
</tr>
<tr>
<td>color</td>
<td>Sets the colour of text</td>
<td>&lt;p style=&quot;color: red&quot;&gt;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>&lt;h6 style=&quot;color: fff99&quot;&gt;</td>
</tr>
<tr>
<td>font-family</td>
<td>Sets the font of text</td>
<td>Note US spelling of &quot;color&quot;</td>
</tr>
<tr>
<td>background-color</td>
<td>Sets the background colour of a paragraph</td>
<td>&lt;p style=&quot;background-color:yellow&quot;&gt;</td>
</tr>
<tr>
<td></td>
<td>Sets the background colour of the entire page</td>
<td>&lt;body style=&quot;background-color:green&quot;&gt;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>&lt;body style=&quot;background-color:#ff0000&quot;&gt;</td>
</tr>
<tr>
<td>float</td>
<td>Use in &lt;img&gt; tag to set the alignment of an image in a paragraph. Can wrap a graphic around text</td>
<td>&lt;img src=&quot;smiley.png&quot; style=&quot;float:right&quot;&gt;</td>
</tr>
</tbody>
</table>

Styles can be combined in a single tag simply by separating them with semi-colons (;) e.g.

<p style = "font-size: 14px; color: orange; font-family: Bodoni">
Appendix C: HTML Colour (color!) Codes

These codes are created in a numbering system called hexadecimal (base 16, with digits from 0-15). Hexadecimal runs out of digits at 9, so starts using letters (A=10, B=11, etc). Each pair of hex digits defines the amount of red, green and blue in a colour e.g. 0000FF means no red (00), no green (00) and all blue(FF).

<table>
<thead>
<tr>
<th>Colour Code</th>
<th>Red</th>
<th>Green</th>
<th>Blue</th>
</tr>
</thead>
<tbody>
<tr>
<td>000000</td>
<td>00</td>
<td>00</td>
<td>00</td>
</tr>
<tr>
<td>003300</td>
<td>00</td>
<td>03</td>
<td>00</td>
</tr>
<tr>
<td>006600</td>
<td>00</td>
<td>06</td>
<td>00</td>
</tr>
<tr>
<td>009900</td>
<td>00</td>
<td>09</td>
<td>00</td>
</tr>
<tr>
<td>00CC00</td>
<td>00</td>
<td>0C</td>
<td>00</td>
</tr>
<tr>
<td>00FF00</td>
<td>00</td>
<td>0F</td>
<td>00</td>
</tr>
<tr>
<td>330000</td>
<td>33</td>
<td>00</td>
<td>00</td>
</tr>
<tr>
<td>333300</td>
<td>33</td>
<td>33</td>
<td>00</td>
</tr>
<tr>
<td>336600</td>
<td>33</td>
<td>66</td>
<td>00</td>
</tr>
<tr>
<td>339900</td>
<td>33</td>
<td>99</td>
<td>00</td>
</tr>
<tr>
<td>33CC00</td>
<td>33</td>
<td>CC</td>
<td>00</td>
</tr>
<tr>
<td>33FF00</td>
<td>33</td>
<td>FF</td>
<td>00</td>
</tr>
<tr>
<td>660000</td>
<td>66</td>
<td>00</td>
<td>00</td>
</tr>
<tr>
<td>663300</td>
<td>66</td>
<td>33</td>
<td>00</td>
</tr>
<tr>
<td>666600</td>
<td>66</td>
<td>66</td>
<td>00</td>
</tr>
<tr>
<td>669900</td>
<td>66</td>
<td>99</td>
<td>00</td>
</tr>
<tr>
<td>66CC00</td>
<td>66</td>
<td>CC</td>
<td>00</td>
</tr>
<tr>
<td>66FF00</td>
<td>66</td>
<td>FF</td>
<td>00</td>
</tr>
<tr>
<td>990000</td>
<td>99</td>
<td>00</td>
<td>00</td>
</tr>
<tr>
<td>993300</td>
<td>99</td>
<td>33</td>
<td>00</td>
</tr>
<tr>
<td>996600</td>
<td>99</td>
<td>66</td>
<td>00</td>
</tr>
<tr>
<td>999900</td>
<td>99</td>
<td>99</td>
<td>00</td>
</tr>
<tr>
<td>99CC00</td>
<td>99</td>
<td>CC</td>
<td>00</td>
</tr>
<tr>
<td>99FF00</td>
<td>99</td>
<td>FF</td>
<td>00</td>
</tr>
<tr>
<td>CC0000</td>
<td>CC</td>
<td>00</td>
<td>00</td>
</tr>
<tr>
<td>CC3300</td>
<td>CC</td>
<td>33</td>
<td>00</td>
</tr>
<tr>
<td>CC6600</td>
<td>CC</td>
<td>66</td>
<td>00</td>
</tr>
<tr>
<td>CC9900</td>
<td>CC</td>
<td>99</td>
<td>00</td>
</tr>
<tr>
<td>CCC000</td>
<td>CCC</td>
<td>00</td>
<td>00</td>
</tr>
<tr>
<td>CCF000</td>
<td>CCF</td>
<td>00</td>
<td>00</td>
</tr>
<tr>
<td>FF0000</td>
<td>FF</td>
<td>00</td>
<td>00</td>
</tr>
<tr>
<td>FF3300</td>
<td>FF</td>
<td>33</td>
<td>00</td>
</tr>
<tr>
<td>FF6600</td>
<td>FF</td>
<td>66</td>
<td>00</td>
</tr>
<tr>
<td>FF9900</td>
<td>FF</td>
<td>99</td>
<td>00</td>
</tr>
<tr>
<td>FFC000</td>
<td>FFC</td>
<td>00</td>
<td>00</td>
</tr>
<tr>
<td>FFFF00</td>
<td>FFF</td>
<td>00</td>
<td>00</td>
</tr>
</tbody>
</table>