

Compsci Study Notes

Chapter 1

- **Applications:** Computer program
- **Computer Hardware:** One of the 5 fundamental components of an information system
- **Computer-based information system:** An information system that includes a computer
- **Data:** Recorded facts or figures. One of the 5 fundamental component of an information system
- **Five component framework:** 5 components of an information system
 - o *Computer Hardware*
 - o *Software*
 - o *Data*
 - o *Procedures*
 - o *People (always present in every system)*
- **Information communications technology sector:** Provides products and services that other industries rely on to get their work done
- **Information System:** A group of components that interact to produce information
- **Information technology:** The products, methods, inventions, and standards that are used for the purpose of producing information
- **Management Information systems:** An information system that helps businesses achieve their goals and objectives
- **Moore's Law:** A law(by Gordon Moore) stating the number of transistors per square inch of an integrated chip doubles every 18 mths. It has been proved accurate for 40 years since it was made
- **People:** Part of 5 component framework/information system. Includes those who operate and service the computers, those who maintain the data, those who support the networks, and who uses the system
- **Procedures:** Instructions for humans. One of the five fundamental components of an information system
- **Software:** instructions for computers. One of the fundamental components of an information system

Chapter 2

- **Accurate information:** is based on correct and complete data and its been processed correctly
- **Activity:** Part of a business process that transforms resources and information of one type into resources and information of another type(manual or automated)
- **Alternatives formulation:** a step in the decision making process in which decision makers lay out various alternatives
- **Automated system:** An information system in which hardware and software components do most of the work

- **Business process:** a network of activities, resources, facilities, and information that interact to achieve some business function (aka Business system)
- **Business process management:** the process of generating information that will be useful for management and strategy decisions
- **Business process modelling notation:** A standard set of terms and graphical notations for documenting business processes
- **Choice:** A step in the decision making process in which decision makers analyze their alternatives and select one
- **Executive information system:** an information system that supports strategic decision making
- **Facilities:** structures used within a business procedure
- **Implementation:** a step in the decision making process in which decision makers implement the alternative they have selected
- **Information:**
 - o Knowledge derived from data(recorded facts and figures)
 - o Data presented in a meaningful context
 - o Data processed by summing, ordering, averaging, grouping, comparing, other operations
 - o A difference that makes a difference
- **Intelligence-gathering:** The first step in the decision making process in which decision makers determine what's to be decided, what the criteria for selection will be and what data are available
- **Just barely sufficient information:** Information that meets the purpose for which it is generated, but just barely so
- **Managerial decision:** decision that concerns the allocation and use of resources
- **Manual system:** an information system in which the activity of processing information is done by people, without the use of automated processing
- **Operational decision:** decisions that concern the day to day activities of an organization
- **Relevant Information:** Information that is appropriate to both the context and the subject
- **Resources:** Items of value, such as inventory or funds, that are part of a business process
- **Review:** The final step in the decision making process in which decision makers evaluate results of their decision and if necessary repeat the process to correct or adapt the decision
- **Strategic decision:** decision that concerns broader scope, organizational issues
- **Structured decisions:** a type of decision for which there is a formalized and accepted method for making the decision
- **Sufficient Information:** adequate information to perform the task
- **Timely Information:** Information that is produced in time for its intended use
- **Transaction Processing system:** An information system that supports operational decision making
- **Unstructured Decision:** A type of decision for which there is no agreed-on decision making method
- **Worth its cost information:** When an appropriate relationship exists between the cost of information and its value

Chapter 3

- **Business Value:** Tangible benefits for organizations through either more efficient use of resources or effective delivery of their services to customers
- **Competitive Strategy:** The strategy an organization chooses as the way it will succeed in its industry. *Michael Porter* says there are four fundamental competitive strategies:
 - o Cost leadership across an industry
 - o Cost leadership within a particular industry segment
 - o Product differentiation across an industry
 - o Product differentiation within a particular industry segment
- **Diffusion of Innovation:** The process by which an innovation is communicated through certain channels over time among the members of a social system
- **Disruptive Technologies:** Products that introduce a very new package of attributes from the accepted mainstream products
- **Effectiveness:** Doing the right things
- **Five Forces Model:** A model proposed by *Michael Porter* that assesses industry characteristics and profitability by means of five competitive forces:
 - o Bargaining power of suppliers
 - o Threat of substitution
 - o Bargaining power of customers
 - o Rivalry among firms
 - o Threat of new entrants
- **Margin:** The difference between value and cost
- **Primary Activities:** In *Michael Porter's* value chain model, the fundamental activities that create value:
 - o Inbound logistics
 - o Operations
 - o Outbound logistics
 - o Marketing/Sales
 - o Service
- **Productivity:** The creation of business value
- **Productivity Paradox:** The lack of evidence of an increase in worker productivity associated with the massive increase in investment in information technology
- **Support Activities:** In *Michael Porter's* value chain model, the activities that contribute indirectly to value creation:
 - o Procurement
 - o Technology
 - o Human Resources
 - o Firms Infrastructure
- **Sustained Competitive Advantage:** The development of people and procedures that are well supported by the underlying technology

- **Sustaining technologies:** Changes in technology that maintain the rate of improvement in customer value
- **Switching Costs:** The process of locking in customers by making it difficult or expensive for them to switch to another product
- **Value Chain:** A network of value-creating activities

Chapter 4

- **Antivirus Programs:** Software that detects and possibly eliminates viruses
- **Application software:** Programs that performs a business function. Some application programs are general(Excel or Word) but other applications are specific to a business function, such as accounts payable.
- **Basic Input/ Output System:** An important piece of firmware when a computer is initially booted up:
 - o The first thing the computer does is to load *BIOS* from *Rom* and run through the commands provided by the firmware
 - o *BIOS* checks to make sure the memory and input devices are functional
 - o Once these are working, the operating system will be loaded
- **Binary Digits:** the means by which computers represent data(aka bits). A binary digit is either zero or one
- **Blog:** An online journal that makes use of information technology to publish information over the internet
- **Botnet:** Set of computers or applications that are coordinated through a network and used to perform malicious tasks
- **Byte:**
 - o a character of data
 - o An 8-bit chunk
- **Cache:** A file on a domain resolver that stores domain names and IP addresses that have been resolved. Then when someone else needs to resolve that same domain name, there is no need to go through the entire resolution process. Instead, the resolver can supply the IP address from the local file
- **Central Processing Unit:** The CPU selects instructions, processes them, performs arithmetic and logical comparisons, and stores results of operations in memory
- **Client:** A computer that provides work processing, spreadsheets, database access, and usually a network connection
- **Cloud Computing:** Customers do not necessarily own the computer they use. Instead, hardware, software, and applications are provided as a service, usually through a web browser. *The cloud* is a metaphor
- **Custom Developed Software:** Software which is tailor-made for a company or organization
- **Data Channel:** Means by which the CPU reads instructions and data from main memory and writes data to main inventory

- **Firmware:** Computer software that is installed into devices like printers, print services, and various types of communication devices. The software is coded just like other software, but it is installed into special programmable memory of the printer or other devices
- **Gigabyte(GB):** 1024 MB
- **Grid Computing:** The concept in which several computers are used to address a single problem at the same time. Grid computing uses software to divide and apportion pieces of a program among several computers, sometimes many thousands
- **Hardware:** Electronic Components and related gadgetry that input, process, output, store, and communicate data according to instructions encoded in computer programs/software.
- **Hertz:** Cycles of CPU Speed
- **Horizontal-market application:** Software that provides capabilities common across all organizations and industries; examples include: word processors, graphics programs, spreadsheets, and presentation programs
- **Input Hardware:** Hardware devices that attach to a computer; includes: keyboards, mouse, document scanners, and barcode scanners
- **Instruction Set:** The collection of instructions that a computer can process
- **Kilobyte(KB):** 1025 bytes
- **License:** Agreement that stipulates how a program can be used. Most specify the number of computers on which the program can be installed and sometimes the number of users that connect to and use the program remotely such agreements also stipulate limitations on the liability of the software vendor for the consequences of errors in the software
- **Linux:** A version of *UNIX* that was developed by the open source community. The open-source community owns Linux, and there is fee to use it. Linux is a popular operating system for web servers
- **Mac OS:** An operating system developed by Apple(for Mac). The current version is *Mac OS X*. They're primarily used by graphic artists. Was developed for the Power PC but as of 2—6 it ruins on Intel processors as well
- **Macro Virus:** Virus that attaches itself to a Word, Excel, PowerPoint or other type of document. When the infected document is opened, the virus places itself in the start-up files of the application. After that, the virus infects every file that the application creates or processes.
- **Mainframes:** The first digital computing machines used un business and government
- **Main Memory:** A set of cells in which each cell holds a byte of data or instruction; each cell has an address and the CPU uses the addresses to identify particular data items
- **Megabyte:** 1024 Kb
- **Memory Swapping:** The movement of programs and data into and out of memory. If a computer has insufficient memory for its workload, such swapping will degrade system performance.
- **Microcomputer:** Smaller than mainframes, the precursor to personal computers
- **Non-volatile Memory:** Memory that preserves data contents even when not powered(eg. Magnetic and optical discs). With such devices you can turn the computer off and back on and the contents will be unchanged.
- **Off the Shelf Software:** Commercial Software

- **Off the Shelf with Alterations:** Commercial software which has been modified for a particular organization
- **One of a Kind application:** Software that is developed for a specific, unique need, usually for a particular company's operations
- **Open Source Community:** A loosely coupled group of programmers who mostly volunteer their time to contribute code to develop and maintain common software. *Linux* and *MySQL* are prominent products developed by such a community.
- **Operating System(OS):** A computer program that controls the computers resources. It manages the contents of main memory, processes keystrokes, and mouse movements, sends signals to the display monitor, reads and writes desk files, and controls the processing of other programs
- **Output Hardware:** Hardware that displays the results of the computer's processing. Consists of video displays, printers, audio speakers, overhead projectors, and other special-purpose devices, such as large flatbed plotters
- **Patch:** A group of fixes for high-priority failures that can be applied to existing copiers of a particular product. Software vendors supply patches to fix security and other critical problems
- **Payload:** The program code of a virus that causes unwanted or hurtful actions, such as deleting programs or data, or even worse, modifying data in ways that are undetected by the user.
- **Processing Devices:**
- **Server:** A computer that provides some type of service, such as hosting a database, running a blog, publishing a website, or selling goods. Server computers are faster, larger and more powerful than client computers
- **Server Farm:** A large collection of server computers that coordinates the activities of the servers, usually for commercial purposes.
- **Special Function Cards:** Cards that can be added to the computer to augment the computer's basic capabilities
- **Storage Hardware:** Hardware that saves data and programs. Magnetic disk is by far the most common storage device, although optical disks, such as CDs and DVDs are also popular
- **Tailor-made Software:** Software adapted to a particular organization's needs
- **Terabyte (TB):** 1024 GB
- **Thick Client:** A software application that requires programs other than just the browser on a user's computer- that is, that requires code on a both a client and server computer
- **Thin Client:** A software application that requires nothing more than a browser and can be run on only the user's computer
- **Unix:** An operating system developed at Bell Labs in the 1970s. it has been the workhorse of the scientific and engineering communities since then
- **Vertical-market Application:** Software that serves the needs of a specific industry. Examples of such programs are those used by dental offices to schedule appointments and bill patients those used by auto mechanics to keep track of customer data and customers' automobile repairs
- **Virus:** A computer program that replicates itself; unchecked replication is like a computer cancer by which ultimately the virus consumes the computer's resources. Many viruses also take unwanted and harmful actions
- **Volatile:**

- **Weblog:** An online journal that makes use of information technology to publish information over the internet
- **Windows:** An operating system designed and sold by Microsoft. It is the most widely used operating system
- **Worm:** A virus that propagates using the internet or some other computer network. Worm code is written specifically to infect another computer as quickly as possible
- **Zombie:** Subsequent computers infected with a worm of virus that infected an initial Computer

Chapter 6

- **10/100/1000 Ethernet:** Products equipped with this conform to the 802.3 specification and allow for transmission at a rate of 10,100,1000 Mbps
- **Access Control List(ACL):** A list that encodes the rules stating which packets are to be allowed through a firewall and which are prohibited
- **Access Point:** A point in a wireless network that facilitates communication among wireless devices and serves a point of interconnection between wireless and wired networks. The AP must be able to process messages according to both the 802.3 and 802.11 standards, because it sends and receives wireless traffic using the 802.11 protocol and communicates with wired networks using the 802.3 protocol.
- **Advanced Research Projects Agency Network (ARPANET):** The world's first operation packet switching network, which provided access to many research investigations who were geographically separated from the small number of large, powerful research computers available at the time.
- **Analog Signal:** A wavy signal. A modem converts the computers digital data into analog signals that can be transmitted over dial-up Internet connections
- **Asymmetric Digital subscriber Line(ADSL):** DSL lines that have different upload and download speeds
- **Broadband:** Internet communication lines that have speeds in excess of 256 kbps. DSL and cable modems provide broadband access
- **Browser:** A program that processes HTTP protocol; receives, displays, and processes HTML documents; and transmits responses
- **Cable Modem:** A type of modem that provides high-speed data transmission using cable television lines. The cable company install a fast, high-capacity optical fibre cable to a distribution centre in each neighbourhood hat it serves. At the distribution centre, the optical fibre cable connects to regular cable-television cables that run to subscribers homes or businesses. Cable modems modulate in such a way that their signals do not interfere with TV signals. Like DSL lines, they are always on.
- **Code Division Multiple Access(CDMA):** A mobile device network widely used in North America
- **Collaboration:** Occurs when two or more people work together to achieve a common goal, result, or product

- **Communication Systems:** Email, virtual private networks, instant messaging, and more sophisticated communications systems, dependant on the network technology available in an organization
- **Dial-Up Modem:** A modem that performs the conversion between analog and digital in such a way that the signal can be carried on a regular telephone line
- **Domain Name System(DNS):** A system that converts user-friendly names into their IP addresses. Any registered, valid name is called a domain name
- **Digital Subscriber Line(DSL) modem:** A special telephone which connects home and small-business computers to an ISP
- **Encryption:** The process of transforming clear text into coded, unintelligible text for secure storage or communication
- **Ethernet:** Another name for *IEEE 802.3* protocol, Ethernet is a network protocol that operates at Layers 1 and 2 of the TCP/IP-OSI architecture. Ethernet, the world's most popular LAN protocol,
- **Firewall:** A computing device located between a firm's internal and external network that prevents unauthorized access to or from the internal networks that prevents unauthorized access to or from the internal network. A firewall can be a special-purpose computer or it can be a program on a general-purpose computer or on a router.
- **GPS:** A collection of dozens of satellites orbiting the earth that transmit precise microwave signals. A GPS receiver can calculate its position measuring the distance between itself and several of the satellites.
- **Global System for mobile communication(GSM):** The most widely adopted type of mobile device network; the standard in Europe, Asia, and South America
- **Hypertext transfer protocol(HTTP):** A layer-5 protocol used to process web pages
- **IEEE 802.3 protocol:** The standard, also called *Ethernet*, is a network protocol that operates at layer 1 and 2 of the TCP/IP-OSI architecture
- **Internet:** The public network of networks known as the internet
- **internet:** The private network of networks
- **Internet Service Provider(ISP):** An ISP provides a user with a legitimate Internet address; it serves as the user's gateway to the internet; and it passes communications back and forth between the user and the internet. ISPs also pay for the internet. They collect money from their customers and pay access fees and other charges on the user's behalf
- **IP Address:** A series of dotted decimals in a format like *192.168.2.28* that identifies a unique device on a network or internet. With the IPv4 standard, IP addresses have 32 bits. With the IPv6, they have 128 bits. Today, IPv4 is more common but will likely be supplanted by IPv6 in the future. IPv4, the decimal between the dots can never exceed 255
- **Local Area Network(LAN):** A network that connects computers that reside a single geographic location on the premises of the company that operates the LAN. The number of connected computers can range from two to several hundred.
- **MAC (Media Access Control) address:** Also called *physical address*. A permanent address given to each network interface card(NIC) at the factory. This address enables the device to access the network via a level-2 protocol. By agreement among computer manufacturers, MAC addresses are assigned in such a way that no two NIC devices will have the same MAC address.

- **M-Commerce:** Short for mobile commerce, applications allow mobile phones to conduct certain kinds of transactions, such as mobile banking and mobile ticket purchases at movie theatres and sporting events.
- **Modem:** Short for *modulator/demodulator*, a modem converts the computer's digital data into signals that can be transmitted over telephone or cable lines
- **Narrowband:** Internet communication lines that have transmission speeds of 56 kbps or less. A dial-up modem provides narrowband access.
- **Network:** A collection of computers that communicate with one another over transmission lines
- **Network Externality:** The larger the number of people using a network, the more valuable that network becomes
- **Network Interface Card(NIC):** A hardware component on each device on a network(computer, printer, etc.) that connects the device's circuitry to the communication lines. The NIC works together with programs in each device to implement Layers 1 and 2 of the TCP/IP-OSI hybrid protocol
- **Onboard NIC:** A built-in NIC
- **Optical fibre Cable:** A type of cable used to connect the computers, printers, switches, and other devices on a LAN. The signals on such cables are light rays, and they are reflected inside the glass core of the optical fibre cable. The core is surrounded by a *cladding* to contain the light signals, and the cladding, in turn, is wrapped with an outer layer to protect it
- **Packet-filtering firewall:** A firewall that examines each packet and determines whether to let the packet pass. To make this decision, it examines the source address, the destination address, and other data
- **Packet Switching network:** System in which messages are first disassembled into small packets, then sent through the network and reassembled at the destination
- **Port:** A number used to uniquely identify a transaction over a network
- **Protocol:** A standardized means for coordinating an activity between two or more entities
- **Router:** A special-purpose computer that moves network traffic from one node on a network to another
- **Smart Phone:** Phones which combine a powerful processor with sophisticated operating systems and cellular network technology to provide a host of applications to their users including voice, text, e-mail, web browsing, etc.
- **Switch:** A special purpose computer that receives and transmits data across a network
- **Symmetrical digital subscriber line (SDSL):** DSL lines that have the same upload and download speeds
- **Transmission control program/ internet protocol(TCP/IP):** Provides definition and specification of the network layers
- **Transmission Media:** Physical media, such as copper cable and optical fibre(glass fibre) cable or wireless media transmitting light or radio frequencies(including cellular and satellite systems) which transmit electronic signals.
- **Tunnel:** A virtual, private pathway over a public or shared network from the VPN client to the VPN server

- **Uniform resource location(URL):** A document's address on the Web, URLs begin on the right with a top-level domain, and moving left, include a domain name and then are followed by optional data that locates the document with that domain
- **Unshielded twisted pair (UTP) cable:** A type of cable used to connect the computers, printers, switches, and other devices on a LAN. A UTP cable has four pairs of twisted wire. A device called an RJ-45 connector is used to the UTP cable into NIC devices
- **Virtual private network(VPN):** A WAN connection alternative that uses the Internet or a private internet to create the appearance of private point-to-point connections. In the IT world, the term *virtual* means something that appears to exist that does not exist in fact. Here a VPN uses the public Internet to create the appearance of a private connection
- **Web Crawler:** A software program that browses the web in a very methodical way
- **Wide area network(WAN):** A network that connects computers located at different geographic locations
- **Wireless NIC (WNIC):** Devices that enable wireless networks by communicating with wireless access points. Such devices can be cards that slide into the PCMA slot they can be built-in, onboard devices. WNICs operate according to the 802.11 protocol
- **Workflow:** A process or procedure by which content is created edited used, and disposed.

Key Concepts

- **Format**
 - <Html>
 - <Head>
 - <Title></Title>
 - </Head>
 - <Body>
 -
 - </Body>
 - </Html>
- **Tags**
 - <I> Italics
 - Bold
 - <U> Underline
 - <P> Paragraph
 -
 Break Note: No end code needed
 - <Hr> Horizontal Line
 - <Hx> For Heading where x represents a number 1-6. 1 is the largest, 6 is the smallest
 - Image
- **Anchor**
 - <A>
 - For Websites

- For Pictures
- Anchors can also be used as bookmarks
- **Tables**
 - <Table Border = x> *Default is one*
 - <Tr>
 - <Td></Td>
 - <Td>.... </Td>
 - </Tr>
 -
 - </Table Border=x>
- **Lists**
 - Order Lists
 - and
 - is for items in list
 - <Type x>
 - A (LETTERS)
 - a (letters)
 - I (Roman Numerals Uppercase)
 - Little "l" (lowercase Roman Numerals)
 - Unordered Lists
 - and
 - is for items in list
 - <Type x>
 - Discs (solid disc = default)
 - Circle (hollow circle)
 - Square (Solid square)
 - Sometimes Unordered Lists are nested in Ordered Lists
- **HTML is not Case sensitive**

XML

- Case Sensitive
- Sample Below

Example 1

```
<?xml version="1.0"?>
<ns1:EmployeeExpenses xmlns:ns1="http://www.mybusiness.com">
  <ns1:EmployeeInfo>
    <ns1:Name>Jane Winston</ns1:Name>
    <ns1:Department>Accounts Payable<ns1:/Department>
  </ns1:EmployeeInfo>
  <ns1:ExpenseItem>
    <ns1>Date>2007-01-07</ns1>Date>
    <ns1:Description>Airfare</ns1:Description>
    <ns1:Amount>500.34</ns1:Amount>
  </ns1:ExpenseItem>
  <ns1:ExpenseItem>
    <ns1>Date>2007-01-07</ns1>Date>
    <ns1:Description>Hotel</ns1:Description>
    <ns1:Amount>200</ns1:Amount>
  </ns1:ExpenseItem>
  <ns1:ExpenseItem>
    <ns1>Date>2007-01-07</ns1>Date>
    <ns1:Description>Taxi Fare</ns1:Description>
    <ns1:Amount>50.00</ns1:Amount>
  </ns1:ExpenseItem>
  - </ns1:EmployeeExpenses>
```

Example 2

```
<?xml version="1.0"?>
<note>
  <to>Tove</to>
  <from>Jani</from>
  <heading>Reminder</heading>
  <body>Don't forget me this weekend!</body>
</note>
```

XML SCHEMA

```
<?xml version="1.0"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema">

<xs:element name="note">
  <xs:complexType>
    <xs:sequence>
      <xs:element name="to" type="xs:string"/>
      <xs:element name="from" type="xs:string"/>
      <xs:element name="heading" type="xs:string"/>
      <xs:element name="body" type="xs:string"/>
    </xs:sequence>
  </xs:complexType>
</xs:element>

</xs:schema>
```

Example 2

```
<xsd:schema xmlns:xsd="http://www.w3.org/2001/XMLSchema">
<xsd:element name="Employees">
<xsd:complexType>
<xsd:sequence>
<xsd:element maxOccurs="unbounded" name="Employee">
<xsd:complexType>
<xsd:sequence>
<xsd:element name="Name"></xsd:element>
<xsd:element minOccurs="0" name="Office"></xsd:element>
<xsd:element minOccurs="0" name="Phone"></xsd:element>
</xsd:sequence>
</xsd:complexType>
</xsd:element>
</xsd:sequence>
</xsd:complexType>
</xsd:element>
</xsd:schema>
```

Excel

- **Referencing**
 - o *Relative*
 - Default
 - B23*D9-K12
 - When copied to another cell:
 - C24*E10-L13

- *Absolute*
 - $\$B23 * D\$9 - \$K\12
 - When copied to another cell:
 - $=\$B24 * E\$9 - \$K\12
- *Mixed*
 - Rarely Used
 - Row or Column is Absolute and other is relative
- **Boolean Operations**
 - NOT, AND, OR
 - NOT (complements results of a Boolean Expression)
 - Ex. $=NOT(Age \geq 19)$
 - AND (combines two Boolean Expressions)
 - Only true if both expressions are true
 - Ex. $AND(Balance \geq 20.00, ATM = "true")$
 - OR (combines two Boolean Expressions)
 - True if one or both expressions are true
 - Ex. $=OR(Depart = "R \&D", Salary > 50000)$
- **Logical Functions**
 - IF Statements
 - Requires three parts
 - Condition
 - Ex. Sales = 10000
 - Value if Condition is True
 - Value if Condition is False
- **Statistical Functions**
 - SUM
 - MAX, MIN, AVERAGE
 - COUNT and COUNTA
 - TRUNC
 - Truncates a number to an integer by removing the fractional part of the number
 - SUMIF and COUNTIF
 - Do action based if the conditions are satisfied
 - Ex. $=SUMIF(A1:B10, ">500")$
 - Sums the values of cells between A1 and B10 if the value is greater than 500
- **Financial Functions**
 - PMT
 - $=PMT(rate, nper, pv, fv, type)$
 - Rate= Interest Rate
 - Nper= Number of Payments
 - PV = Present Value

- FV = Future Value
- Type:
 - 0 --> at the end of the period(Default)
 - 1 --> payment due at the beginning of the period

- **VLOOKUP**

- Four required arguments
 - Numeric Value(or cell) to look up
 - Range of the Table
 - Column number containing the value to return
 - Mode/ Range Look up
- =VLOOKUP(*value, table, offset, mode*)
 - Value is the item you are looking for
 - Table is the lookup table
 - Offset is the position of the column within the table with the related value(EG C =3)
 - Mode:
 - False -> an exact match search
 - True -> An approximate match search (default)

- **HLOOKUP**

- Four required arguments
 - Numeric Value(or cell) to look up
 - Range of the Table
 - Row number containing the value to return
 - Mode/ Range Look up
- =HLOOKUP(*value, table, offset, mode*)
 - Value is the item you are looking for
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