

Software = Computer Programs

- ❖ **Software**, are a set of **programs**, that tells the computer what tasks to perform
 - ◆ **System Software**
 - ◆ **Operating System** = Delivers hardware and software resources
Windows, MacOS, Linux, BSD, Chrome, iOS, Android
 - ◆ **Utility Programs** = Performs maintenance-type tasks
Virus Scanner: McAfee, NAV, Bitdefender, AVG, Avast,
 - ◆ **Applications Software**
 - ◆ Word Processing: MS Word, LibreOffice Write
 - ◆ Spreadsheets: MS Excel, LibreOffice Calc
 - ◆ Presentation Graphics: MS PowerPoint, LibreOffice Impress
 - ◆ Database: MS Access, LibreOffice Base
 - ◆ Office Suites: Microsoft Office, LibreOffice, OpenOffice
 - ◆ Browsers: Brave, Chrome, Firefox, Opera, Safari, Edge
 - ◆ Code Editor: VS Code, Atom, Notepad, TextEdit

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Functions of an Operating System

- ❖ **Booting the Computer**
 - ◆ Loads operating system into RAM memory
 - ◆ **Kernel** is opening batch of instructions of OS
- ❖ **Accesses hardware connected to computer**
 - ◆ Configures Hardware Devices
 - ◆ Device drivers are **firmware** for hardware
 - ◆ Plug and Play devices are recognized automatically and their drivers are loaded by OS
- ❖ **Provides User Interface (UI)**
 - ◆ Displays the **desktop** as your starting point
 - ◆ Desktop Background image called **wallpaper**
 - ◆ **Icons** to represent programs, folders, and files

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Functions of an Operating System

- ❖ **Security**
- ❖ **Passwords**
- ❖ **Managing Network Connections**
 - ◆ Manages wired connections to network
 - ◆ Manages wireless connections Wifi, 4G
- ❖ **Memory Management**
 - ◆ Optimizing the use of main memory (RAM)
 - ◆ Virtual memory uses hard drive storage when RAM is full
- ❖ **Manage and Monitor Resources & Jobs**
 - ◆ Detects problems and attempts recovery
 - ◆ Schedules jobs tasking
- ❖ **File Management**
 - ◆ Windows Explorer
 - ◆ Files usually viewed in hierarchical folder (directory) structure
- ❖ **Firewall**

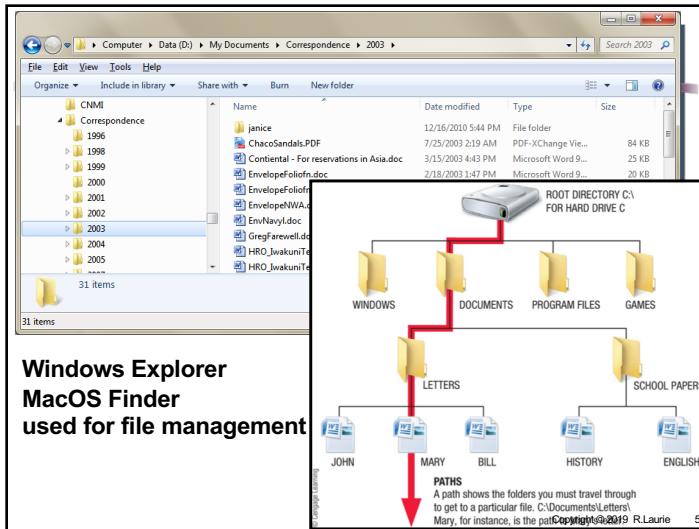


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Task Manager and Tray

TASK MANAGER																																																																																					
Win	[Ctrl]	[Alt]	[Del]	These programs are running, even before any application programs are launched by the user.																																																																																	
			<table border="1"> <thead> <tr> <th>Image Name</th> <th>User Name</th> <th>CPU</th> <th>Memory</th> <th>Description</th> </tr> </thead> <tbody> <tr><td>atexec.exe</td><td>Debbie</td><td>00</td><td>2,728 K</td><td></td></tr> <tr><td>CCC.exe</td><td>Debbie</td><td>00</td><td>11,204 K</td><td>Catalyst...</td></tr> <tr><td>ccsvdft.exe ...</td><td>Debbie</td><td>00</td><td>4,204 K</td><td>Symantec...</td></tr> <tr><td>curls.exe</td><td>Debbie</td><td>00</td><td>5,272 K</td><td></td></tr> <tr><td>DpAgent.exe</td><td>Debbie</td><td>00</td><td>1,672 K</td><td>DigitalPer...</td></tr> <tr><td>DPAgent.exe ...</td><td>Debbie</td><td>00</td><td>7,232 K</td><td>DigitalPer...</td></tr> <tr><td>dwm.exe</td><td>Debbie</td><td>00</td><td>16,640 K</td><td>Desktop...</td></tr> <tr><td>explorer.exe</td><td>Debbie</td><td>00</td><td>39,724 K</td><td>Windows...</td></tr> <tr><td>GrafEx.exe</td><td>Debbie</td><td>00</td><td>96 K</td><td>GfxUtil...</td></tr> <tr><td>gfpspers.exe</td><td>Debbie</td><td>00</td><td>2,800 K</td><td>persistent...</td></tr> <tr><td>Host.exe</td><td>Debbie</td><td>00</td><td>2,644 K</td><td>Catalyst...</td></tr> <tr><td>msasn1c.exe</td><td>Debbie</td><td>00</td><td>24,960 K</td><td>Part...</td></tr> <tr><td>msasn1c.exe</td><td>Debbie</td><td>00</td><td></td><td></td></tr> <tr><td>Shield32.exe</td><td>Debbie</td><td>00</td><td></td><td></td></tr> <tr><td>SympPhr.exe</td><td>Debbie</td><td>00</td><td></td><td></td></tr> </tbody> </table>			Image Name	User Name	CPU	Memory	Description	atexec.exe	Debbie	00	2,728 K		CCC.exe	Debbie	00	11,204 K	Catalyst...	ccsvdft.exe ...	Debbie	00	4,204 K	Symantec...	curls.exe	Debbie	00	5,272 K		DpAgent.exe	Debbie	00	1,672 K	DigitalPer...	DPAgent.exe ...	Debbie	00	7,232 K	DigitalPer...	dwm.exe	Debbie	00	16,640 K	Desktop...	explorer.exe	Debbie	00	39,724 K	Windows...	GrafEx.exe	Debbie	00	96 K	GfxUtil...	gfpspers.exe	Debbie	00	2,800 K	persistent...	Host.exe	Debbie	00	2,644 K	Catalyst...	msasn1c.exe	Debbie	00	24,960 K	Part...	msasn1c.exe	Debbie	00			Shield32.exe	Debbie	00			SympPhr.exe	Debbie	00		
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MacOS	[Option]	[Command]	[Esc]	These programs were launched during the boot process and will show in the notification area unless they are closed by the user (right-click an icon to see if you can close that program).																																																																																	

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Differences Among Operating Systems

❖ Command Line Interface

- ◆ Requires user to communicate instructions to computer via typed commands
- ◆ DOS = Single-User, Single Task OS

❖ Graphical User Interface

- ◆ Graphics based interface
- ◆ Single-User, Multi Task OS
- ◆ Most OS's today use GUI
 - ◆ Windows 95, 98, 2000, NT, ME, XP
 - ◆ Windows Vista, 7, 8, 10
 - ◆ Mac OSX, MacOS Mojave
 - ◆ Linux Desktops



Types of Operating Systems

- ❖ **Standalone (Personal) Operating Systems**
 - ◆ Designed for single computer installation
 - ◆ Desktop, laptop, notebook, tablet, or smartphone
- ❖ **Server (Network) Operating Systems**
 - ◆ Designed for network server computer
 - ◆ Many client computers make requests
 - ◆ Controls access to network resources
 - ◆ MS Windows Server, Apple Server, Linux Server
- ❖ **Embedded (Mobile) Operating Systems**
 - ◆ Smart phones: iOS, Android, Kindle
 - ◆ Appliances: Cars, Microwaves, DVD player

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Unix and Linux

- ❖ **UNIX: AT&T and Sun Microsystems**
 - ◆ Intended for workstations and servers
- ❖ **Linux**
 - ◆ Developed by Linus Torvalds in 1991 grad project
 - ◆ Open-source software: usually free without support
 - ◆ <http://distrowatch.com/>
 - ◆ My favorites are: Zorin, Ubuntu Mate, Mint
- ❖ **Strong support from mainstream companies**
 - ◆ Google, Oracle, IBM, HP, and Novell
 - ◆ Android OS is a derivative of Linux
 - ◆ MacOS is a derivative of UNIX

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Utility Programs

- ❖ Software that is usually related to managing or maintaining the computer
- ❖ Many utilities are built into operating systems
 - ◆ Control Panel accesses common utilities
 - ◆ File management program = Windows Explorer
 - ◆ Search Tools = integrated into Windows Explorer
 - ◆ Diagnostic and Disk Management Programs
 - ◆ Uninstall and Cleanup Utilities
 - ◆ File compression programs = iZarc and Windows Explorer
 - ◆ Backup and Recovery Utilities
- ❖ Can be stand-alone products
 - ◆ Antivirus Scanner = BitDefender, AVG and Avast
 - ◆ Spyware Scanner = Spybot Search and Destroy
 - ◆ VirtualBox.org = Virtualization running an OS within an OS

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Application Software Distribution

- ❖ Commercial software, mass-produced for purchase
 - ◆ Microsoft, Adobe, AutoDesk
 - ◆ Software license (Copyright)
 - ◆ Specifies the conditions software can be used
 - ◆ installations, concurrent-use, single-user, multi-user
 - ◆ EULA – End User Licensing Agreement
 - ◆ Usually absolves software maker of liability
 - ◆ Terms agree to when you purchase and accept the license
- ❖ Shareware, copyrighted software = free for trial period
- ❖ Web app software, hosted on Web site uses browser
 - ◆ Subscription purchase but sometimes free
- ❖ Open source software = free
 - ◆ provided for use, modification, and redistribution
- ❖ Public-domain software
 - ◆ Freeware and no copyright restrictions

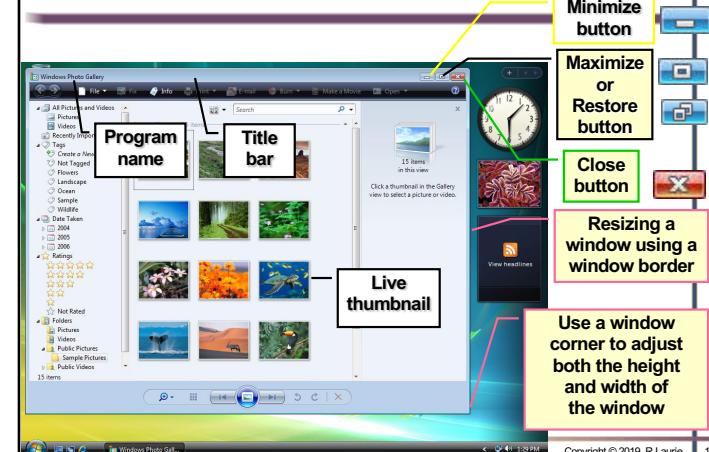
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Application Software

- ❖ Productivity Software
 - ◆ Microsoft Office
 - ◆ Word Processing = MS Word
 - ◆ Spreadsheets = MS Excel
 - ◆ Presentation Graphics = MS PowerPoint
 - ◆ Database = MS Access
 - ◆ Accounting = MS Money
 - ◆ Project Management = MS Project
 - ◆ LibreOffice or OpenOffice are OpenSource and Free
- ❖ Graphics and Video Editing
- ❖ Communications: Email, IM, Web, VOIP
- ❖ Home: Tax, Personal Finance, Education

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Resizing Buttons and Edges



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Using Toolbars, Menus, and Shortcuts

The screenshot shows a Windows Photo Gallery window with the following labels:

- Toolbar**: Located at the top left.
- File menu**: Located at the top left, with a callout pointing to the "File" button.
- Click File button**: A callout pointing to the "File" button in the menu bar.
- Keyboard shortcut**: A callout pointing to a keyboard shortcut key (e.g., Ctrl+C) in the menu.
- Dimmed command is not available**: A callout pointing to a dimmed menu item.
- Command**: A callout pointing to a standard menu item.

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Using Dialog Boxes

The screenshot shows the "Print" dialog box with the following labels:

- Some menu or ribbon commands automatically display a dialog box**
- A dialog box is a type of window in which you specify how to complete an operation**
- A dialog box may have one or more tabs for organizing related settings together on a single sheet**

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Office Suite Software

- Programs designed to make users more productive and assist them with tasks**
- Microsoft Office = packaged software**
 - Core applications: Word, Excel, PowerPoint, Access**
 - Personal Information Manager – Outlook**

The screenshot shows the Microsoft Word ribbon interface with the following labels:

- FILE TAB**: Contains common document commands, such as Save and Print.
- QUICK ACCESS TOOLBAR**: Contains command buttons for frequently used commands; can be modified by the user.
- TABS**: Organize related groups of commands; the Home tab is currently selected.
- GALLERY**: Displays sets of options that can be selected for a particular feature; this is the Styles gallery.
- RIBBON**: Contains tabs of commands; the Home tab is selected.
- LIVE PREVIEW**: Changes the appearance of selected items when a formatting command is pointed to.
- MINI TOOLBAR**: Appears when text is selected with a mouse.
- COMMAND BUTTONS**: Issue a command or display a list of related commands.
- GROUPS**: Related commands on the Ribbon are organized into groups; these are the Font and Paragraph groups.
- DIALOG BOX LAUNCHER**: Opens a dialog box or task pane for that group.
- MORE BUTTON**: Opens a gallery to display more options.
- HELP BUTTON**: Launches the Office Help system.

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Word Processing

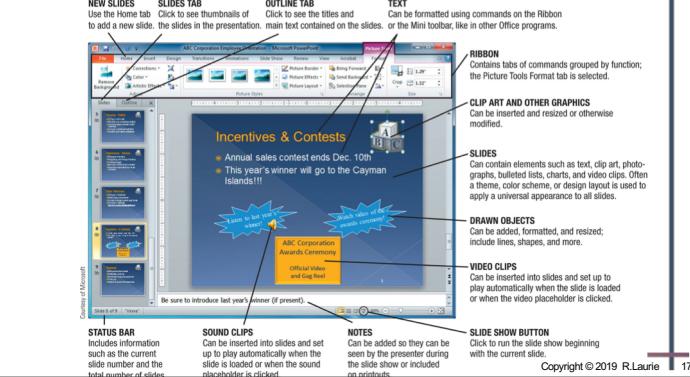
The screenshot shows a Microsoft Word document with the following labels:

- FONT FACE**: The font face of the selected text is currently being changed.
- FONT SIZE**: Measured in points; the size of the selected text is 36 pts.
- FILENAME**: Appears on the title bar once a file has been saved one time.
- ALIGNMENT**: The selected text is centered.
- CONTEXTUAL TAB**: Provides access to additional commands when objects (such as the clip art image below) are selected.
- STYLES**: Can be used to apply the same formatting to similar sections of the document.
- HEADER**: Text entered by the user that appears at the top of each page.
- CLIP ART**: Clip art and other graphics can be inserted and resized or otherwise modified as necessary.
- WORD WRAP**: Wraps text to the next line automatically when the text being typed reaches the end of the current line; the user should not press Enter until the end of the paragraph.
- TABLE**: Can be used to neatly organize data or lay out the text in a document.
- FOOTER**: Text entered by the user that appears at the bottom of each page. This footer contains the page number.

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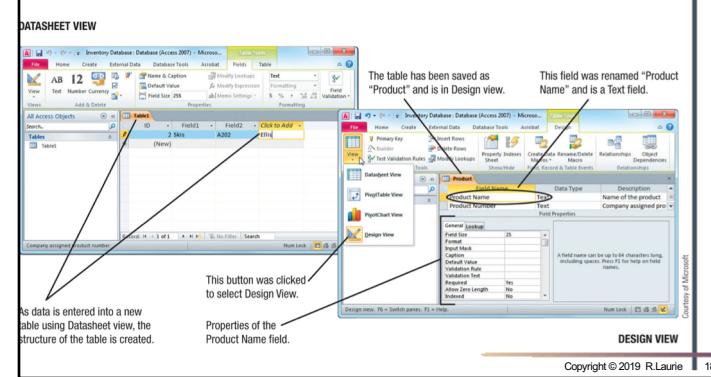
Presentation Graphics

- ❖ **Presentation software** is used to create visual aids for presentations to communicate to a group



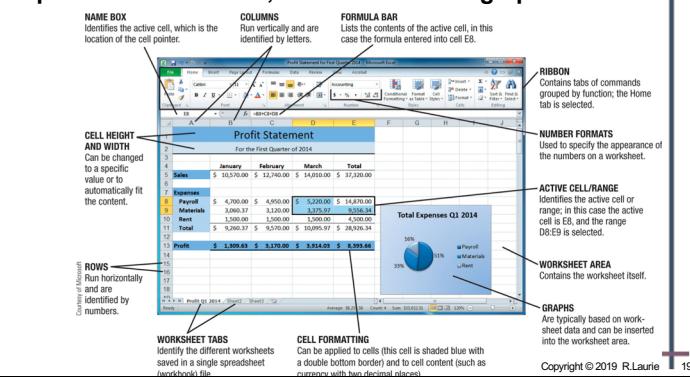
Database

- ❖ A **database** is a collection of data organized in a manner that allows access, retrieval, and use of data



Spreadsheet

- ❖ **Spreadsheet software** allows users to organize data, perform calculations, and **chart** data as graphic



Spreadsheets

- ❖ A spreadsheet is an electronic version of a business ledger
 - ❖ Organizes information in a 2-D Tabular grid
 - ❖ Performs Calculations based on grid position

	JAN.	FEB.	MAR.	APR.	TOTAL
SALES	1750	1501	1519	1430	6200
COST OF GOODS SOLD	964	960	962	943	3819
GROSS MARGIN	786	521	587	487	2381
NET EXPENSE	98	93	82	110	383
ADM EXPENSE	77	79	69	88	313
MISC EXPENSE	28	45	31	31	135
TOTAL EXPENSES	203	217	182	229	831
AVERAGE EXPENSE	68	72	61	76	277
NET BEFORE TAXES	583	304	405	258	1550
FEDERAL TAXES	303	153	211	134	806
NET AFTER TAX	280	146	194	124	744

Spreadsheet Uses and Advantages

❖ Spreadsheets Uses

- ◆ Home: Budgets, Loans, Investments
- ◆ Education: Calculate Grades
- ◆ Business:
 - ◆ Accounting, Payroll, Sales, Taxes, Inventory
 - ◆ Statistical data analysis and forecasting
- ◆ Scientific and Engineering: Data Analysis

❖ Advantages of Spreadsheets

- ◆ Save time and fewer errors
- ◆ Automatically recalculate values
 - ◆ Formulas can be entered for cells
 - ◆ If cell value changes recalculates values in dependent cells
- ◆ Can represent data trends visually using **Charts**
- ◆ Allows “what if” analysis for decision making

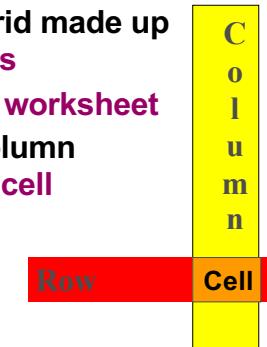
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Worksheet

❖ Data appears in a grid made up of **rows** and **columns**

❖ This grid is called a **worksheet**

❖ Where a row and column intersect is called a **cell**



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Cell Address and Active Cell

❖ Cell Address

- ◆ Identified by the column letter and the row number
- ◆ Each cell has a unique address

	A	B	C
1	A1		C1
2		B2	C2
3			C3

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Cell Address and Active Cell

❖ Cell Address

- ◆ Identified by the column letter and the row number
- ◆ Each cell has a unique address

❖ Active Cell C2

- ◆ Changes can only take place in the active cell
- ◆ Selected using mouse cursor or arrow keys

	A	B	C
1	A1		C1
2		B2	C2
3			C3

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Cell Address and Cell Range

❖ Cell Address

- ◆ Identified by the column letter and the row number
- ◆ Each cell has a unique address

❖ Active Cell

- ◆ Changes can only take place in the active cell
- ◆ Selected using mouse cursor or arrow keys

❖ Cell Range A1:C2

- ◆ Select using mouse drag or Shift and Arrow keys

	A	B	C
1	A1		C1
2		B2	C2
3			C3

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Cell Contents

❖ Contains 1 of 3 types of information

◆ Label

- ◆ Text Information

◆ Value

- ◆ Number

◆ Formula

- ◆ Calculation
- ◆ Dependent on other cells

- ◆ Can use *Functions* which are

- ▶ =B2-B3
- ▶ =SUM(B2:B4) to calculate the sum of a range
- ▶ =AVERAGE(B2:B4) to calculate the average of a range

	A	B	C
1		Jan.	Feb.
2	Sales	1750	1328
3	Cost	964	625
4	Gross	786	703

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Excel Workbook and Worksheets

❖ Workbook contains one or more worksheets

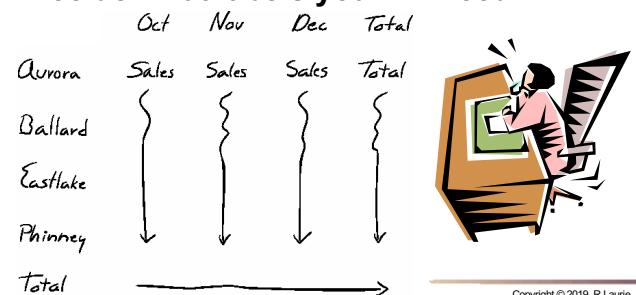
	Oct.	Nov.	Dec.	Total
1 Aurora	1006	978	956	2940
2 Ballard	1675	1566	1430	4671
3 Eastlake	1378	1340	1198	3916
4 Phinney	1312	1390	1150	3852
7 Total	5371	5274	4734	15379

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Plan your Spreadsheet

❖ Put your first draft on paper, planning what will go into the rows and columns.

❖ Decide what labels you will need.



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Enter Labels

- ❖ Create a title and label columns and rows appropriately with text

Montly Sales for Each Office				
	Oct.	Nov.	Dec.	Total
Aurora				
Ballard				
Eastlake				
Phinney				
Total				

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Enter Values

- ❖ Enter data into appropriate cells

Montly Sales for Each Office				
	Oct.	Nov.	Dec.	Total
Aurora	1006	978	956	
Ballard	1675	1566	1430	
Eastlake	1378	1340	1198	
Phinney	1312	1390	1150	
Total				

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Enter Formulas

- ❖ Create formulas that reference cells
 - ◆ Absolute references \$B\$4 \$B4 B\$4
 - ◆ Relative references B4

Montly Sales for Each Office				
	Oct.	Nov.	Dec.	Total
Aurora	1006	978	956	2940
Ballard	1675	1566	1430	
Eastlake	1378	1340	1198	
Phinney	1312	1390	1150	
Total	5371			

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Copy and Paste Formulas

- ❖ When copy and paste into new cells
 - ◆ Absolute references uses same cell reference
 - ◆ Relative references use incremented cell reference

Monthly Sales for Each Office				
	Oct.	Nov.	Dec.	Total
Aurora	1006	978	956	2940
Ballard	1675	1566	1430	4671
Eastlake	1378	1340	1198	3916
Phinney	1312	1390	1150	3852
Total	5371	5274	4734	15379

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Automatic Recalculation

- ❖ When a data value changes all dependent formulas are recalculated immediately

Monthly Sales for Each Office				
	Oct.	Nov.	Dec.	Total
Aurora	1006	978	956	2940
Ballard	1675	1566	1502	4743
Eastlake	1378	1340	1198	3916
Phinney	1312	1390	1150	3852
Total	5371	5274	4806	15451

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Formatting Spreadsheets

- ❖ Spreadsheets have formatting features that allow worksheet layout customization
 - ◆ Font Face, Size, and Color
 - ◆ Column width
 - ◆ Row height
 - ◆ Clip Art
 - ◆ Number format
 - ◆ \$1357
 - ◆ \$1,356.75
 - ◆ (\$22.50)
 - ◆ -\$22.50
 - ◆ 150%

Catapult Coffee 4th Quarter Sales				
	Oct.	Nov.	Dec.	Total
Aurora	\$ 1,006	\$ 978	\$ 956	\$ 2,940
Ballard	\$ 1,675	\$ 1,566	\$ 1,502	\$ 4,743
Eastlake	\$ 1,378	\$ 1,340	\$ 1,198	\$ 3,916
Phinney	\$ 1,312	\$ 1,390	\$ 1,150	\$ 3,852
Total	\$ 5,371	\$ 5,274	\$ 4,806	\$ 15,451

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Visualizing Data

- ❖ Spreadsheets organize numerical data and calculations in tabular form
- ❖ Numerical information contained in a worksheet can be expressed visually in the form of a *chart*
 - ◆ Charts allow the user to show numerical data in ways that are meaningful and quickly understood
 - ◆ Easy to see trends both historical and predictive
 - ◆ Easy to compare data series and identify patterns





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Selecting a Range and Chart

First, the cells to be charted are selected

Oct.	Nov.	Dec.	Total	
Aurora	\$ 1,006	\$ 978	\$ 956	\$ 2,940
Ballard	\$ 1,675	\$ 1,566	\$ 1,502	\$ 4,743
Eastlake	\$ 1,378	\$ 1,340	\$ 1,198	\$ 3,916
Phinney	\$ 1,312	\$ 1,390	\$ 1,150	\$ 3,852
Total	\$ 5,371	\$ 5,274	\$ 4,806	\$ 15,451

Chart Wizard - Step 1 of 4 - Chart Type

First, the cells to be charted are selected

Oct.	Nov.	Dec.	Total	
Aurora	\$ 1,006	\$ 978	\$ 956	\$ 2,940
Ballard	\$ 1,675	\$ 1,566	\$ 1,502	\$ 4,743
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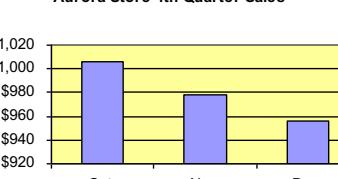
Oct. Nov. Dec. Total

Clustered Column. Compares values across categories.

Press and Hold to View Sample

Cancel < Back Next > Finish

Aurora Store 4th Quarter Sales



Oct.	Nov.	Dec.
\$1,020	\$980	\$960
\$1,000	\$990	\$970
\$980	\$970	\$950
\$960	\$940	\$920

Multiple Series Column Charts

❖ What is represented?

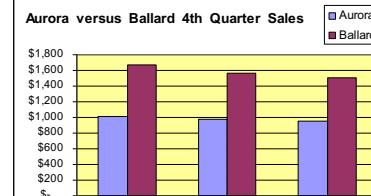
❖ Chart elements

- ◆ **Category Labels** – descriptive text entries (Aurora, Ballard, Oct)
- ◆ **Data Points** – numeric values (cell data)
- ◆ **Data Series** – grouping of data points (2 data series exist in this chart specified by the row data)

❖ This is Column Chart

- ◆ Compares two series
- ◆ Multiple Data Series Chart

Catapult C office 4th Quarter Sales				Total
	Oct.	Nov.	Dec.	
Aurora	\$ 1,006	\$ 978	\$ 956	\$ 2,940
Ballard	\$ 1,675	\$ 1,566	\$ 1,502	\$ 4,743
Eastlake	\$ 1,378	\$ 1,340	\$ 1,198	\$ 3,916
Phinney	\$ 1,312	\$ 1,390	\$ 1,150	\$ 3,852
Total	\$ 5,371	\$ 5,274	\$ 4,806	\$ 15,451



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Stacked Bar Chart

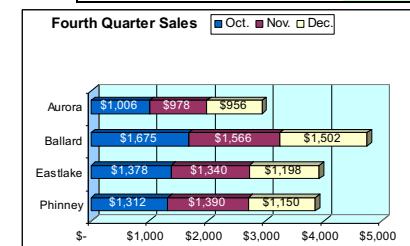
❖ What is represented?

cells to
be
charted

Catapult C office 4th Quarter Sales				Total
	Oct.	Nov.	Dec.	
Aurora	\$ 1,006	\$ 978	\$ 956	\$ 2,940
Ballard	\$ 1,675	\$ 1,566	\$ 1,502	\$ 4,743
Eastlake	\$ 1,378	\$ 1,340	\$ 1,198	\$ 3,916
Phinney	\$ 1,312	\$ 1,390	\$ 1,150	\$ 3,852
Total	\$ 5,371	\$ 5,274	\$ 4,806	\$ 15,451

Stacked Bar Chart

- ◆ Best for comparing multiple data series with a total value
- ◆ Compares Total Quarterly Sales for each location
- ◆ This chart also displays values



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Pie Charts: Parts of a Whole

❖ What is represented?

cells to
be
charted

Catapult C office 4th Quarter Sales				Total
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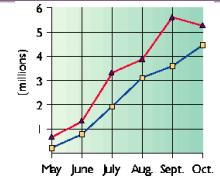
Line Charts: Trends

❖ Line Charts are the best way to visualize trends or cycles over a period of an extended period of time

❖ Line graphs are usually used when there are many values or complex data

❖ Examples:

- ◆ Stock Price versus Time
- ◆ Corporate Revenue versus Time
- ◆ Sales versus Time



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