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The license may not give you all of the permissions necessary for your intended use. For example, other rights such as publicity, privacy, or moral rights may limit how you use the material. File Explorer is a file browser that helps you access, view and manage all the files stored on your computer. It’s an important part of Windows, but it can also be used on almost any other operating system as well. The main purpose of File Explorer is to provide an easy way to access different types of files stored on your machine, including documents, images, music and videos. It makes navigating through your hard drives much easier and more organized. How does File Explorer work? The File Explorer works by giving you access to all of your computer's folders and files. It will list the available folders within your computer, allowing you to open them up one at a time. You can then double-click on any file or folder to open it up in order to view its contents. From within the File Explorer window, you can also select multiple items using checkboxes or drag-and-drop them into other locations on your computer. How do I open File Explorer? You can open File Explorer by pressing the Windows start button or simply by pressing the Windows key and E at the same time. Once you launch File Explorer from the start menu it will open a window that contains all your disks and folders. How do I find files in File Explorer? In order to find a file in File Explorer, enter its name in the search box located at the top right corner of the window. You can also use filters to narrow down your search results according to criteria such as type, size or date modified. You can also use side bar options such as “Folders” or “Network locations” to quickly access files located within them. What are some useful features in File Explorer? File explorer has lots of useful features like previewing documents and photos before opening them; sharing documents over networks; creating new folders; copying, moving and deleting files; setting folder/file permissions. You can also change viewing styles from thumbnails to lists which helps with navigation as well as organization. What is the dragging and dropping feature in File Explorer? The drag-and-drop feature allows for quick movement between folders without having to manually copy/move files one at a time using right click menus or keyboard shortcuts like Ctrl + c or Ctrl + V respectively. It allows you to select multiple items just by holding down left click while dragging them into another folder location with ease. How do I move files using File Explorer? You can quickly move a file using drag-and-drop where you simply select it and drag while holding it down left click onto another location within folder explorer itself or outside windows entirely (e.g.: another program). Another way would be via Copy and Paste where you need to copy the selected file(s) first before pasting them into another location with either keyboard shortcut (Ctrl+C then Ctrl+V) or right clicking on selection>choose “copy” followed by clicking on target location then choosing “paste” from right click menu again! Both methods work equally well so it comes down to personal preference which one works best for you. How do I delete files using File Explorer? To delete a single file, you can select it then press delete key (or trash icon if present) from top menu/ribbon bar within file explorer window itself! To remove multiple items at once just select all desired elements while pressing CTRL key simultaneously then click delete key again, this will send them all straight into recycle bin within fraction of second! If a recycle bin exceeds its capacity, then data will be permanently wiped away, so make sure to empty the recycle bin regularly. What are hidden items in File Explorer? Hidden items are those elements which are not displayed normally in normal view mode but still exist somewhere inside storage unit like hard drive or external media device. They could be either system related (e.g., registry entries) protecting important data from virus alteration or user set private content meant only accessible after entering certain credentials, this feature could be extremely useful if set up correctly as no one else would even know what resides inside without prior knowledge (password) making entire environment totally secure against malicious attacks. How do I unhide hidden items in File Explorer? In order to unhide hidden items there are several methods available depending on individual setup. Generally, most versions of Windows have option called, show hidden files and folders- just accessible under View tab while others require calling specific command line instructions via Run prompt dialogue box found under Start Menu section instead or else third-party software app such specialized uninstallers sometimes come preloaded with this ability too, making whole process lot easier. What should I do if something goes wrong when using File Explorer? If something does happen during usage eG freezing / crashing suddenly, it could mean one thing trouble shooting! This usually involves trying out a few different steps starting off with most general ones eg restarting PC, trying safe mode bootup combining few combination keys during startup, running disk clean up scan. till finally going into deeper levels such reinstalling OS version entirely!! But remember, backup copies are critical. Can I get other apps connected with my Windows Explorer? Yes definitely possible to get other apps connected with your windows explorer for better productivity and organization reasons e.g., OneDrive cloud service app provides ability sync all selected local files and subfolders across multiple devices run by same Microsoft account thereby enable anytime anywhere secure access even sharing between peers networking circles likewise Google Drive even Dropbox but previously have taken setup measures setup properly otherwise only few isolated pieces data assets able seen let alone make active usage nowadays also visual studio code convenient integrated environment working web development projects specific terms side frontend part website creation aspect go further more software development related grounds. How do I add new folders within my existing file hierarchy? To add new folders create from existing folders within your existing file hierarchy simply navigate until you find desired location first then either hit CTRL+Shift+N keyboard shortcut or right click mouse button followed by selecting New > Folder option from context menu which will bring up empty subfolder container ready for completion task either rename directly preferably short and concise words combo or press enter key plus further subfolders nesting until reaching desired hierarchical endpoints structure built-up wise. Are there any security concerns with using the File Explorer? There aren’t any major security concerns with using the built-in Windows version of the File explorer if you’re practicing safe computing habits such as regularly running antivirus scans and not clicking on suspicious links that may lead to malware infections. However, some third-party explorer programs may introduce vulnerabilities if they aren't updated frequently with new patches or bug fixes so be sure to research those carefully before installing them onto your device. Is there a way to customize my file folder? Yes! File Explorer offers plenty of options for customizing your experience. You can choose different icon sets for each folder type as well as change how thumbnails are displayed (large/small size) or how long file names are displayed when browsing through items in a folder. Additionally, if you want more control over which options appear in each context menu when right-clicking on items in a folder, those settings are accessible too. What types of gestures can be used in File Explorer? File Explorer provides a variety of gestures that can help you more easily manage and access files. These include tapping or clicking on an item to open it, dragging and dropping items into a folder, swiping the screen to scroll through long lists of files, and pinching or stretching your fingers on the touchpad to zoom in and out of images. Additionally, some versions of the File Explorer will allow you to use special shortcuts like holding down 'Shift' or 'Ctrl' to select multiple items at once. Is there a way to preview what's inside a file before opening it up? Yes! Most items within the File Explorer offer a "preview" option when right clicked on with your mouse. For example, if you right-click on an image file, a small thumbnail preview will appear along with its file size information and other relevant details. Some even offer additional action such as rotating pictures when viewing their previews as well. Microsoft Windows File Explorer lets you access various files on your disk drive, but it doesn’t have enough features to accomplish some tasks. Its interface has not been upgraded for a while now either. This app does not support dual panes, which means you cannot move files between two folders without opening two windows. It doesn’t support file tagging either, forcing you to create sub-folders in order to organize your files. With these reasons in mind, you may want to use a third-party file explorer app that packs more features than the default, in-built explorer. That’s why we’ve rounded up 10 of the best alternative explorers to use in managing your folders and files on your Windows PC. The best alternatives to Windows File Explorer are designed with unique and advanced features you can use to manage your files effectively with ease. Some are even better than the default file manager itself. One Commander, Explorer++, TagSpaces to name a few. The best Windows File Explorer alternative is Directory Opus which offers plenty of great features. It also works as an FTP client, image converter, and a file compressor tool. Directory Opus offers a clean layout with the ability to find files in multiple directories. Keep reading to discover the best features of these alternative tools. Also Read: Best Windows Alternatives Best Windows File Explorer Alternatives 1. One Commander One Commander gives you the balance of style and substance in a single application. You get to switch between two panes to make your work easier. If you need to work with one pane, just hide the other by clicking the arrows on the edges. Besides its minimalistic interface, One Commander lets you choose between light and dark themes. What makes this app more exciting to use is its portability. Unlike Windows File Explorer, you can save this app on an external drive and carry it with you wherever you go, and you’ll never have to worry about delays. It doesn’t need an installation either. With One Commander, you can tag files with a color. It has seven colors, and all you need is to right-click the files then tag them. You can also see video files within this app. Close to the upper right corner, there’s a “Change Files View” button that allows you to customize the folder/file view. If you want, you can also create a note for the current folder you’ll be viewing. At the bottom left corner, you can toggle a column view to give your folders a physical look and feel. Using the File Automator, you’ll be able to mass-convert images into JPG format or mass-rename your files. The Pro version allows you to bulk-convert file types to various formats or run a script on the files. From the Settings tab, you can replace app icons and toggle the acrylic effect of the app window. You’ll go as far as choosing the accent color or changing the scrollbar width. The general settings tab also lets you disable animations or change their duration. Those are just a few of the many alterations you can carry out on Once Commander’s appearance. Explore: Best Windows Media Player Alternatives 2. Directory Opus Directory Opus is an excellent file manager for you, most especially if you’re a power user. It comes packed with a clean interface, two viewing panes, and you can open multiple directories. Its search option is pretty compelling as it lets you search files from different directories. What sets Directory Opus apart is its FTP features, tabbed browsing, filter and sort, and multi-threading functionalities. As a premium file explorer alternative, the app’s icon-led interface is busy with plenty of customizations. The multi-threading enables fast processing, letting you queue and manage all your operations. Directory Opus has a Lite and Pro version to make file management a breeze. Compared to Windows File Explorer, this app is more advanced as it doubles as a file compression tool, integrated image converter, FTP client, and uploader. It also provides integrated metadata editing. You can also save your complex search terms as macros to use later. Directory Opus can enhance your productivity with top-notch functionalities like locating duplicate files, script support, and customizing the status bar. This incredible file explorer comes with a file tree mechanism that lets you toggle freely between files. For more convenience, you are allowed to include descriptions, ratings, icons, colors, and tags in your files for identification. This tool also supports batch file renaming. With this app, you can fully replace the default file manager as it integrates well with Windows OS. The app has a Light and Pro version with prices available on demand. Also Read: Best Windows Firewall Alternatives 3. Explorer++ Explorer++ gives you the ultimate Windows experience. It is not only open-source; it’s also a free app with a plethora of functionalities and features. Its interface is fully customizable. Explorer++ comes with a dual-pane for browsing and OneDrive integration – something that Windows File Explorer doesn’t have. You get to move, sort, split, and filter your files with this one. It also offers folder tabs and allows you to bookmark files, change the dates and attributes of all files, perform advanced searches, and save your directory listings. Just like a browser, Explorer++ will enable you to open up your folders in tabs for ease of management. You can even use keyboard browser shortcuts like Ctrl+T or CTR+W to open or close tabs. If you want to move folders and files between tables or duplicate tabs, you can do so with this app. The software works seamlessly with other apps to move data. The drag and drop function will do all the work for you, and better yet, you can take it with you anywhere. It is 100% free to use. Also Read: Best Keynote Alternatives For Windows 4. Q-Dir While most apps use a two-pane interface, Q-Dir lets you enjoy a four-pane seamless file management process. If you have different folders and files to work on, this app will come in handy, saving you a lot of time. On top of that, the app is lightweight, with an interface similar to Windows XP Explorer. It gives you the power to rename, unzip, and move files around with ease. This Quad explorer can help you create and customize your folder tabs, organize your files in a pattern, and most of all, it’s free. You also have tabbed browsing and a bookmark function at your disposal. Q-Dir has a clutter-free interface. The only drawback is its tiny icons. But overall, it is an excellent file and folder manager you may want to explore. It doesn’t use your system resources and can work well even on an old computer model. It also allows you color filters for your files and folders, full Unicode support, and visible branch trees in the directory folders, which cannot be said about Windows File Explorer. It is a free app. Check Out: Best MS Office Alternatives For Windows 5. TagSpaces TagSpaces is open-source and will let you organize your files effortlessly. The app targets light users and those people who like neat, well-organized files on their PCs. It adds user-defined tags to files such as photos and recipes and allows you to color-coordinate these tags and organize them thematically into groups to manage them without difficulty. The best part is that TagSpaces, unlike Windows File Explorer, will help you stay coordinated on any device and even offers Chromecast support. If you’re using multiple files, you’ll be able to create a tag that separates the ones you’re done from those you’re yet to work on. The app has a built-in file viewer that lets you open files in a side panel. You can also add file descriptions, monitor file changes, perform advanced searches, and add geotags, among other functions. TagSpaces creates image-file thumbnails without relying on the operating system. Whenever you view a folder using this app, it will create a hidden folder with thumbnail images for the image files within that folder. This explicit app also creates verbal tags and a note as tiny files in a folder that you can view through the sidebar. The sidebar lets you switch between light and dark themes. Although it doesn’t map drives, TagSpaces shows you temporary versions of documents that you haven’t saved. With the app, you can’t use cut, copy, and paste functionalities independently; you have to use a combined copy or move function. And when you need to select multiple files, you’ll use the Ctrl or Shift button or the list view menu. TagSpaces not only helps you to come up with multiple accessible categories; it also lets you change key bindings and default colors in the settings menu. TagSpaces Lite version is free. The pro version is $48, pro web is $58, while the enterprise version price is available on request. Also Read: Best iTunes Alternatives For Windows 6. RX Explorer RX Explorer is an exciting file manager with robust features. Besides tabs, it has in-app tools that allow you to view and edit videos, and images, which you can transcode into various file formats. It also supports in-app encryption features and dual-pane mode. What makes this app outstanding is the various customization features like transitions, backgrounds, and animations. Using the custom option, you get to select an Acrylic color, set the transparency, and choose the custom image background you want. You can also customize the font color and perform other customizations. RX Explorer offers multi-tab support, multiple color schemes, and plenty of other file management options. In its settings tab, you can switch the navigation menu to the left or customize icons and fonts. You can also choose to disable the extended context menu or select between the black and white background colors. These are some of the functionalities lacking from Windows File Explorer. The app also allows you to select the background picture and other customizations of your choice or restore the last tab you opened during startup. Although it has limited tagging abilities, RX Explorer lets you manage your files effectively. With highlights like tabbed browsing, versatile file previews, a customizable interface, and powerful file/folder search, you have enough to get going. And you can start using it anywhere as long as you have an external drive. Besides its dual-pane mode, touchscreen mode, dark mode, and instant folder/file marking, you can also stream audio through Bluetooth. It also shows you the files present in a folder and their formats, filters files of particular types, and a list of recently viewed locations. Its top toolbar makes work easy for you by displaying all the features you need to use. RX Explorer also has a script exchange forum with user-generated scripts to use. The application costs $1.24 (the normal price is $2.49) and has a free trial. Also Read: Best Putty Alternatives For Windows 7. XYplorer XYplorer comes with a folder tree structure and a dual-pane for quick file access. The mini tree feature lets you toggle between directories to find the specific file you’re looking for. The file manager supports standard expressions, tabbed browsing, advanced patterns, content search, and fuzzy matching. These are functions you may not find on Windows File Explorer. The search feature helps you locate duplicate files. XYplorer also tags files for excellent switching and organization. The best thing about XYplorer is that it doesn’t use your PCs resources, and it is customizable with modes. The context menu also has extra options, including copy path, file compare, and a powerful paste function. What makes the app exciting to use is its portability and impressive feature set that appeals to both casual and regular users. Its tabs work similarly to web browser tabs, and you can drag files between tabs, reorder the tabs, and pre-configure them. XYplorer also supports custom scripts, secondary sorting, and customized colors and fonts, making it an excellent software to have. XYplorer’s Standard License costs $39.95 and the Lifetime License costs $79.95. There’s a free trial as well. Also Read: Best Photoviewer For Windows 10 8. Altap Salamander Altap Salamander has a very extensive set of networking tools compared to Windows File Explorer. With network protocols support for FTPS, SFTP, SCP, and FTP, your online file transfer is pretty much straightforward. It is equipped with tools to use for multiple networking. It also supports archive file types, including RAR, ZIP, 7-ZIP, UDF images, and ISO images. Altap Salamander has a unique feature, the built-in password manager. The feature helps you protect your personal files and any other sensitive information you have. It uses encryption techniques to protect them against fraudsters and any other threats. This means you don’t need a third-party application to secure your files. The app is reliable and fast. The SFTP and FTP clients are all built-in. It gives you control over your recent history files. With this tool, you get a full display of content in all file formats, including bitmap images, text and binary files, and database files. It is a two-panel software that also features a powerful renamer login and file comparator. If you’re up for a feature-loaded app that allows you multiple networking options, then you’ve got it right here. The app is freeware. Explore: Best GarageBand Alternatives For Windows 9. Files Files is another open-source application with a design that is consistent with the latest Windows 11. It has a polished user interface and supports panes and tabs, with a user-friendly settings menu. When you right-click a file in this app, you’re given an option to create a folder with selection. That means you’ll bypass the process of creating a new folder first before transferring the file, unlike when using Windows File Explorer. It is also easy to enable checkboxes here. Its preview pan can play videos in the same window. In the settings, the appearance button lets you set light or dark modes and choose to have a submenu in the context menu. When you install the Themes addon, you are directed to choose your preferred theme. In the multitasking menu, you’ll be able to enable the dual-pane view, and in the experimental menu, you can enable tags and also make this app your default file explorer. The app packs every feature you need to manage all your files. You get to access all the partitions and also cloud storage, including Google Drive and OneDrive. Your recent files will always be displayed on the home screen, and you can customize settings to your needs. With multi-tab support, you can work on all your files with much ease. Files is completely free to use and is available at the Microsoft Store. Also Read: Best WDS Alternatives 10. Total Commander Total Commander is an age-old app that supports all the major file formats. It can read compressed files independently. This tool has some of the most advanced features, including cloud storage support and more. This software is designed with a classic layout. It supports speedy navigation, adjustable keyboards, and integrated file archiving options. With the tool, you can effortlessly organize and transfer your files and view the progress of the transfer. It also allows you to set the limit of your file transfer, pause in between transfers, and resume the process. Besides having an archiving tool to create and extract archives in different formats, the app also compares files. It has two vertical panels and supports Windows 10 features. The interface is clutter-free, which means you’ll have fast navigation at all times. It also provides customizable keyboard shortcuts. Total Commander helps you transfer large file volumes. The background process manager takes care of that. It can search for text strings in PDF files, sort images by size, and edit music metadata independently. Besides this, you can expand the app with plugins. With this app, you can change each window’s view and add side panels to help you navigate quickly between directories. It also lists your files in a directory in one window to help you manage specific file types from a central place. Additional features that give Total Commander an edge over Windows File Explorer include the batch rename tool, built-in FTP client, directory sync, separate trees, custom columns, enhanced overwrite dialogs, logging, duplicate file finder, advanced search, favorites, and more. The file types supported include 7ZIP, UC2, CAB, ZIP, GZ, ACE, TAR, RAR, LZH, and ACE. It also supports Unicode and parallel port links. Total Commander’s mobile version is free. However, it’s a shareware (demo app) for Windows. Simply put, you may test it for 30 days after which you must order the program’s full version or delete it from the hard disk. Explore: Best LogicPro Alternatives For Windows 11. FreeCommander FreeCommander is another file management app that comes with a dual-pane. You can configure the panes vertically or horizontally, and if you don’t need two, just switch to the single pane mode. It has a smart interface that uses tabs, letting you work with multiple folders. The tree view enables you to organize files effectively. With Windows integration, you’ll have access to the control Panel, DOS command line, Start menu, and system folders. The app also offers thumbnail view inside archives, drag and drop support, wiping of files, linked browsing, and more. FreeCommander supports ZIP archives and works with file paths that are more than 255 characters. You get a structureless view of your folders and files too. And you can conveniently move, sync, compare, rename, copy, or delete your files or folders. This app surpasses Windows File Explorer with its checksum verification and built-in FTP and SFTP clients. It comes with an intuitive, tabbed interface, icons, and shortcuts you can customize. FreeCommander is freeware too. 12. Xplorer² Xplorer² is an excellent file explorer with a dual window interface. It can open a second panel inside a window to access subfolders without minimizing or closing the main folder. It allows you to change the window size or position to horizontal. Its built-in macro function allows you to create custom macros that help to automate repetitive tasks. You’ll just need to turn on the macro and finish your task to allow the app to repeat the task automatically. Xplorer² looks modern, and you get to choose between the ribbon-style interface or the traditional menu bar when working with the app. Some of its unusual features you won’t find on Windows File Explorer include sticky file batch selection (selecting many files at once without the de-selecting risk), identifying duplicate files, and color-coding that lets you identify directories and files at a glance. The horizontal panes have a customizable tree to the left, and tabs will help organize files. Choosing the vertical panels will help you transfer files quickly, though. This application also lets you stay productive since you have complete control of your folders and files. Its speed and efficiency are unmatched, and it’s among the fast-paced file management apps to feature preview documents and files. It also allows you to visualize disk space and folder size. Furthermore, you can customize your functions with the traditional bar and even execute custom commands. Xplorer² comes with a free trial, a Professional version at $29.95, and an Ultimate version at $49.95. Final Thoughts On this list, Directory Opus is the winner. It is designed with a neat interface and two panes for file viewing. Not only can you open multiple directories here, but you can also search your files from multiple directories. This app features multiple file threading functionalities, tabbed browsing, sorting, filtering, and FTP features as well. Besides being a Windows File Explorer alternative, the app is also a file compressor, FTP client, uploader, and image converter. It also allows you to edit metadata and save complex search terms as macros. Your duplicate files will be easily located and renamed, and the tree mechanism will help you toggle between all your files effortlessly. Windows Explorer and File Explorer are both file management tools used to navigate, organize, and manage files and folders on a Windows operating system. While they serve the same basic purpose, there are some differences between the two.Windows Explorer was the original file management tool included in Windows operating systems prior to Windows 8. It was also known as “File Manager” in older versions of Windows. Windows Explorer uses a single window interface, where the left pane shows the file tree and the right pane shows the contents of the selected folder. It is primarily used for file management and searching, as well as accessing system tools such as Control Panel and Computer Management.File Explorer, on the other hand, is the updated file management tool in Windows 8 and later versions. It has a similar interface to Windows Explorer but with some added features and functionality. File Explorer includes a ribbon toolbar, which provides quick access to commonly used functions such as copy, paste, and delete. It also includes a “Quick Access” toolbar, which allows users to pin frequently accessed folders for quick and easy access. Additionally, File Explorer has a more modern look and feel, with support for touchscreens and the ability to view files in a variety of formats.Another key difference between Windows Explorer and File Explorer is the default folder layout. In Windows Explorer, the default layout is to show all files and folders in a single list, sorted by name. In contrast, File Explorer groups files and folders by type, making it easier to find specific files. Additionally, File Explorer includes support for Libraries, which allow users to organize files from multiple locations into a single virtual folder.ConclusionIn summary, while Windows Explorer and File Explorer are both file management tools in Windows operating systems, File Explorer is the updated and more modern version. It includes additional features such as the ribbon toolbar, Quick Access toolbar, and support for touchscreens. Additionally, File Explorer has a different default folder layout and includes support for Libraries. However, both tools serve the same basic purpose of navigating, organizing, and managing files and folders on a Windows operating system. Share — copy and redistribute the material in any medium or format for any purpose, even commercially. Adapt — remix, transform, and build upon the material for any purpose, even commercially. The licensor cannot revoke these freedoms as long as you follow the license terms. Attribution — You must give appropriate credit , provide a link to the license, and indicate if changes were made . You may do so in any reasonable manner, but not in any way that suggests the licensor endorses you or your use. ShareAlike — If you remix, transform, or build upon the material, you must distribute your contributions under the same license as the original. No additional restrictions — You may not apply legal terms or technological measures that legally restrict others from doing anything the license permits. You do not have to comply with the license for elements of the material in the public domain or where your use is permitted by an applicable exception or limitation . No warranties are given. The license may not give you all of the permissions necessary for your intended use. The Wayback Machine - //www.sigchi.org:80/chi96/proceedings/desbrief/Sullivan/kds_txt.htm Kent Sullivan Microsoft Corporation One Microsoft Way Redmond, WA 98052-6399 +1 206 936 3568 kentsu@microsoft.com ABSTRACT The development of the user interface for a large commercial software product like Microsoft® Windows 95 involves many people, broad design goals, and an aggressive work schedule. This design briefing describes how the usability engineering principles of iterative design and problem tracking were successfully applied to make the development of the UI more manageable. Specific design problems and their solutions are also discussed. Keywords Iterative design, Microsoft Windows, problem tracking, rapid prototyping, usability engineering, usability testing. INTRODUCTION Windows 95 is a comprehensive upgrade to the Windows 3.1 and Windows for Workgroups 3.11 products. Many changes have been made in almost every area of Windows, with the user interface being no exception. This paper discusses the design team, its goals and process then explains how usability engineering principles such as iterative design and problem tracking were applied to the project, using specific design problems and their solutions as examples. Design Team The Windows 95 user interface design team was formed in October, 1992 during the early stages of the project. I joined the team as an adjunct member, to provide usability services, in December 1992. The design team was truly interdisciplinary, with people trained in product design, graphic design, usability testing, and computer science. The number of people oscillated during the project but was approximately twelve. The software developers dedicated to implementing the user interface accounted for another twelve or so people. Design Goals The design team was chartered with two very broad goals: Make Windows easier to learn for people just getting started with computers and Windows. Make Windows easier to use for people who already use computers-both the typical Windows 3.1 user and the advanced, or "power", Windows 3.1 user. With over 50 million units of Windows 3.1 and 3.11 installed plus a largely-untapped home market, it was clear from the outset that the task of making a better product was not going to be a trivial exercise. Without careful design and testing, we were likely to make a product that improved usability for some users and worsened it for millions of other users (existing or potential). We understood fairly well the problems that intermediate and advanced users had but we knew little about problems beginning users had. Design Process Given very broad design goals and an aggressive schedule for shipping the product (approximately 18 months to design and code the user interface) we knew from the outset that a traditional "waterfall" style development process would not allow us sufficient flexibility to attain the best-possible solution. In fact, we were concerned that the traditional approach would yield a very unusable system. In the "waterfall" approach, the design of the system is compartmentalized (usually limited to a specification writing phase) and usability testing typically occurs near the end of the process, during quality assurance activities. We recognized that we needed much more opportunity to create a design, try it out with users (perhaps comparing it to other designs), make changes, and gather more user feedback. Our desire to abandon the waterfall model and opt for iterative design fortunately followed similar efforts in other areas of the company, so we had concrete examples of its benefits and feasibility. ITERATIVE DESIGN IN PRACTICE Figure 1 outlines the process that we used. The process was typical of most products designed iteratively: paper or computer-based prototypes were used to try out design ideas and to gather usability data in the lab. Once a design had been coded, it was refined in the usability lab. When enough of the product had been coded and refined, it was examined more broadly, over time, in the field. Minor usability problems identified in the field were fixed before shipping the product. More importantly, the data gathered in the field is being used to guide work on the next version. Our iterative design process was divided into three major phases: exploration, rapid prototyping, and fine tuning. Figure 1: Windows 95 iterative design process. Exploration Phase In this first phase we experimented with design directions and gathered initial user data. We began with a solid foundation for the visual design of the user interface by leveraging work done by the "Cairo" team. We inherited from them much of the fundamental UI and interaction design (the desktop, the "Tray", context menus, three-dimensional look and feel, etc.). We also collected data from product support about users' top twenty problems with Windows 3.1. Figure 2 shows a prototype Windows 95 desktop design that we usability tested in January 1993. This design was based on Cairo and incorporated a first pass at fixing some of the known problems with Windows 3.1 (window management in particular). Figure 2: Early Windows 95 desktop (with callouts to enhance clarity). The top icon, File Cabinet, showed a Windows 3.1 File Manager-type view (left pane shows hierarchy, right pane show contents). The second icon, World, showed items on the network. The third icon, Programs, was a folder which contained other folders full of links to programs on the computer. Along the bottom was the "Tray", which featured three buttons (System, Find, and Help) and a file storage area. Another icon, Wastebasket, was a container for deleted files. The usability studies of the prototype desktop were conducted in the Microsoft usability lab, as were later tests. We conducted typical iterative usability studies. Three to four users representing each distinct group of interest (typically beginning and intermediate Windows 3.1 users) completed tasks which exercised the prototype. Questions we addressed in testing were sometimes very broad (e.g., "Do users like it?") and sometimes very specific (e.g., "After ten minutes of use, do users discover drag and drop to copy a file?"). We collected data typical for iterative studies: verbal protocols, time per task, number of errors, types of errors, and rating information. Early Findings Our usability testing of this prototype revealed much including several surprises: Beginning users and many intermediates were confused by the two-pane view of File Cabinet. (See Figure 3.) They were unsure of the relationship between the panes and how to navigate between folders. Beginners were often overwhelmed by the visual complexity of the File Cabinet and had more basic problems, such as not understanding how folders could exist inside of other folders. Many users were also confused by the Parent Folder icon. It appeared in every folder and looked like a file, yet was really a navigation control for moving up the hierarchy one level. Figure 3: File Cabinet, an early file system viewer. Users of every type were confused by the Programs folder. We thought that having a folder on the desktop with other folders and links to programs inside it would be a natural transition for Windows 3.1 users accustomed to Program Manager, while being relatively easy to learn for beginners. We were wrong! Beginners quickly got lost in all of the folders (unlike File Cabinet, each folder opened into a different window) and other users had a lot of trouble deciding whether they were looking at the actual file system and its files or just links to actual files. Users had considerable difficulty deciding what each of the three buttons on the Tray was for and later had trouble remembering where to go for a particular command because their functions overlapped in certain contexts (e.g., to find something in Help, do you go to Find or to Help?). Comparison to Windows 3.1 From the first lab studies it became clear that we needed a baseline with Windows 3.1, to better understand what problems existed prior to Windows 95 and what problems were unique to the new design. First, we gathered market research data about Windows 3.1 users' twenty most-frequent tasks. We then conducted several lab studies comparing Windows 3.1 and Windows 95, focusing on the top twenty tasks derived from the market research data. We also interviewed professional Windows 3.1 (and Macintosh, for comparison) educators, to learn what they found easy and difficult to teach about the operating system. The key findings were: In Windows 3.1, beginning users took over 9 ½ minutes, on average, to locate and open a program that was not immediately visible. Results were not much better for our Windows 95 prototype. These results were clearly unacceptable, given that our market research data (and common sense) told us that starting a program was users' number one task. Beginning users and some intermediates had a lot of trouble using the mouse, especially double-clicking. As a result, they often failed to find things in containers when the only way to open them was double-clicking. Beginning users and many intermediates relied almost exclusively on visible cues for finding commands. They relied on (and found intuitive) menu bars and tool bars, but did not use pop-up (or "context") menus, even after training. All but the most advanced users did not understand how to manage overlapping windows efficiently. Beginners had the most trouble-when they minimized a window, they considered it "gone" if it was obscured by another window. We heard many stories from educators (and witnessed in the lab) how users caused the computer to run out of RAM by starting multiple copies of a program instead of switching back to the first copy. Intermediate users were more proficient but still had trouble, especially with Multiple-Document-Interface (MDI) applications such as Program Manager and Microsoft Word. Market research data confirmed the problem by revealing that 40% of intermediate Windows users didn't run more than one program at a time because they had some kind of trouble with the process. Beginning users were bewildered by the hierarchical file system. Intermediate users could get around in the hierarchy, but often just barely, and usually saved all of their documents in the default directory for the program they were using. This problem (especially the novice case) was also observed with Macintosh users. A Change of Direction The results from these studies and interviews greatly changed the design of the Windows 95 UI. In the early Windows 95 prototype, we had purposefully changed some things from Windows 3.1 (e.g., the desktop was now a real container) but not others (e.g., File Manager and Program Manager-like icons on desktop) because we were afraid of going too far with the design. We were aware that creating a product which was radically different from Windows 3.1 could confuse and disappoint millions of existing users, which would clearly be unacceptable. However, the data we collected with the Windows 95 prototype and with Windows 3.1 showed us that we couldn't continue down the current path. The results with beginning users on basic tasks were unacceptably poor and many intermediate users thought that Windows 95 was just different, not better. We decided to step back and take a few days to think about the situation. The design team held an offsite retreat and reviewed all the data collected to date: baseline usability studies, interviews, market research, and product support information. As we discussed the data, we realized that we needed to focus on users' most-frequent tasks. We also realized that we had been focusing too much on consistency with Windows 3.1. Essentially, we realized that a viable solution might not look or act like Windows 3.1 but would definitely provide enough value to be attractive for users of all levels, for potentially different reasons. We realized that a truly usable system would scale to the needs of different users: it would be easy to discover and learn yet would provide efficiency (through shortcuts and alternate methods) for more-experienced users. Rapid Iteration Phase As we started working on new designs, we hoped to avoid the classic "easy to learn but hard to use" paradox by always keeping in mind that the basic features of the UI must scale. To achieve this goal, we knew we needed to try many different ideas quickly, compare them, and iterate those which seemed most promising. To do this, we needed to make our design and evaluation processes very efficient. UI Specification Process Evolution Although we had opted for an iterative design approach from the beginning, one legacy of the waterfall design approach remained: the monolithic design specification ("spec"). During the first few months of the project, the spec had grown by leaps and bounds and reflected hundreds of person-hours of effort. However, due to the problems we found via user testing, the design documented in the spec was suddenly out of date. The team faced a major decision: spend weeks changing the spec to reflect the new ideas and lose valuable time for iterating or stop updating the spec and let the prototypes and code serve as a "living" spec. After some debate, the team decided to take the latter approach. While this change made it somewhat more difficult for outside groups to keep track of what we were doing, it allowed us to iterate at top speed. The change also had an unexpected effect: it brought the whole team closer together because much of the spec existed in conversations and on white boards in people's offices. Many "hallway" conversations ensued and continued for the duration of the project. To ensure that interested parties stayed informed about the design, we: Held regular staff meetings for the design team. These weekly (sometimes more often) meetings allowed each of us to check in about what we were doing and to efficiently discuss how what one person was working on affected other work. Broadcasted usability test schedules and results via electronic mail. Design team members received regular notification of upcoming usability tests and results from completed tests so they could more easily keep abreast of the usability information and how the design was evolving. Formally tracked usability issues. With a project the size of Windows 95, we knew we needed a standard way to note all of the usability issues identified, record when and how they were to be fixed, and then close them once the fix was implemented and tested successfully with users. This process is discussed more in the "Keeping Track of Open Issues" section. Held regular design presentations for outside groups. As the project progressed, more and more groups (inside and outside Microsoft) wanted to know what we were doing, so we showed them and demonstrated what we were working on. These presentations were more effective than a written document, because the presentations were easier to keep up-to-date and allowed timely design discussions. Separate UI for Beginners The first major design direction we investigated was a separate UI ("shell") for beginning users. The design was quickly mocked up in Visual Basic and tested in the usability lab. (See Figure 4.) While the design tested well, because it successfully constrained user actions to a very small set, we quickly began to see the limitations as more users were tested: If just one function a user needed was not supported in the beginner shell, s/he would have to abandon it (at least temporarily). Assuming that most users would gain experience and want to leave the beginner shell eventually, the learning they had done would not necessarily transfer well to the standard shell. The beginner shell was not at all like the programs users would run (word processors, spreadsheets, etc.). As a result, users had to learn two ways of interacting with the computer, which was confusing. Figure 4: Partial view of separate shell for beginners. For these reasons and others, we abandoned the idea. Importantly, because we used a prototyping tool and tested immediately in the usability lab, we still had plenty of time to investigate other directions. Rapid Iteration Examples Below are overviews of five areas where we designed and tested three or more major design iterations. There are many more areas for which there is not adequate space to discuss. Launching Programs: Start Menu. Although we abandoned the idea of a separate shell for beginners, we salvaged its most useful features: single-click access, high visibility, and menu-based interaction. We mocked up a number of representations in Visual Basic and tested them with users of all experience levels, not just beginners, because we knew that the design solution would need to work well for users of varying experience levels. Figure 5 shows the final Start Menu, with the Programs sub-menu open. The final Start Menu integrated functions other than starting programs, to give users a single-button home base in the UI. Figure 5: Start menu with Programs item open. Managing Windows: Task Bar. Our first design idea for making window management easier was not very ambitious, but we weren't sure how much work was needed to solve the problem. The first design was to change the look of minimized windows from icons to "plates". (See Figure 6.) We hoped that the problem would be solved by giving minimized windows a distinctive look and by making them larger. We were wrong! Users had almost exactly the same amount of trouble as with Windows 3.1. Our testing data told us that the main problem was windows not being visible at all times, so users couldn't see what they had open or access tasks quickly. This realization led us fairly quickly to the task bar design, shown in Figure 7. Every task has its own entry in the task bar and the bar stays on top of other windows. User testing confirmed that this was a feasible solution to the problem. Figure 6: "Plate" visualization for minimized windows. Figure 7: Task bar with Start button, programs, and clock. Working with Files: "Open" and "Save As" dialogs. Information from product support plus lab testing told us that beginners and intermediates had a lot of trouble using the system-provided dialogs for opening and saving files. (See Figure 8.) The problems stemmed from the fields in the dialog not being in a logical order and having a complex selection methodology. The Cairo team took the lead on this problem and constructed a comprehensive Visual Basic prototype that included a mock file system. We tested many variations until we arrived at the final design shown in Figure 9. Figure 8: Windows 3.1 File.Open dialog box. Figure 9: Windows 95 File.Open dialog box. Printing: Setup Wizard. Product support information told us that printer setup and configuration was the number one call-generator in Windows 3.1. Many of the problems stemmed from the printer setup UI. (See Figure 10.) Searching for a printer was difficult because all printers were in one long list. Choosing a port for the printer, especially in a networked environment, required tunneling down 4-5 levels and featured non-standard and complicated selection behavior. About the time we started work on this problem, members of the design team began investigating wizards as a solution to multi-step, infrequent tasks. Printer setup fit this definition nicely and the resulting wizard tested very well with users. The printer selection screen from the final wizard is shown in Figure 11. Figure 10: Main Windows 3.1 printer setup dialog box. Figure 11: Screen from Windows 95 Add Printer wizard. Getting Help: Search dialog/Index tab. Lab testing of Windows 3.1 showed that users had trouble with the Search dialog in Help. (See Figure 12.) Users had difficulty understanding that the dialog was essentially two parts and that they needed to choose something from the first list and then from the second list, using different buttons. We tried several ideas before arriving at the final Index tab. (See Figure 13.) The Index tab only has one list, and keywords with more than one topic generate a pop-up dialog that users have no trouble noticing. Figure 12: Windows 3.1 Help.Search dialog. Figure 13: Windows 95 Help.Index t

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