December 2020

OPERATING SYSTEM AND METHOD PROVIDING FOR VIRTUAL DESKS

Elle Zadina

Trevor James Claiborne

Gary Hyun Jin Kim

Nikhil Siva Subash

Ahmed Fakhry

See next page for additional authors

Inventor(s)

Elle Zadina, Trevor James Claiborne, Gary Hyun Jin Kim, Nikhil Siva Subash, Ahmed Fakhry, and Mike Ho

OPERATING SYSTEM AND METHOD PROVIDING FOR VIRTUAL DESKS

Abstract

A system and method include an operating system (OS) that provides for the creation, saving and restoration of multiple virtual desks associated with a user. Related resources, applications, windows, tabs, files and the like can be assigned to each virtual desk, thus improving organization and efficiency, and facilitating user focus. The OS stores the multiple virtual desks at the end of a session, including, for example at logout, shutdown, in the event of a system crash, and the like. The multiple virtual desks are restored to a configuration corresponding to the state at the end of the session and/or at the state in which the virtual desk was last accessed when the user accesses the virtual desks in a subsequent session, including restoration of each of the resources associated with the virtual desk, restoration of content within each of the resources, restoration of an arrangement, relative size and placement of the resources, and the like. The OS synchronizes the multiple virtual desks across multiple user devices and provides tools to streamline the creation, population and management of the virtual desks.

Users expend time and effort in creating and organizing resources during a session. Users may create and organize multiple different groupings of resources, related to multiple different projects, efforts, focus areas and the like. Often, the time and effort expended in creating and organizing these groupings of resources is lost at the termination of the session, for example, at logout, or shutdown, in the event of a system crash, in the event the user switches to a different user device and the like. An operating system (OS) in which multiple groupings of related resources such as, for example, applications, windows, tabs and the like, can be organized into virtual desks that can be saved, and that can be restored for use during subsequent sessions may enhance user organization and productivity. The proposed OS provides for the creation and storage of multiple virtual desks and the associated resources, and for the restoration of the multiple virtual desks to the stored configuration in a subsequent access period or session. The stored configuration may include, for example, the specific arrangement of saved resources, applications, tabs, windows, sizing, content and the like. The virtual desks may be restored to include the restoration of the configuration of the virtual desks, allowing the user to easily and readily re-engage, thus enhancing user productivity. The proposed OS allows the user to sync

virtual desks across multiple user devices, so that the virtual desks and the associated resources, content, arrangement and the like is available to the user from the multiple different user devices. The proposed OS facilitates the creation of new virtual desks, and the management of existing virtual desks, based on user preferences and use of and engagement with the virtual desks over time.

Figure 1 illustrates an example screen of a computing device including multiple virtual desks. In the example shown in Figure 1, the virtual desks are arranged in a shelf, or bar, positioned across a top edge portion of the screen.
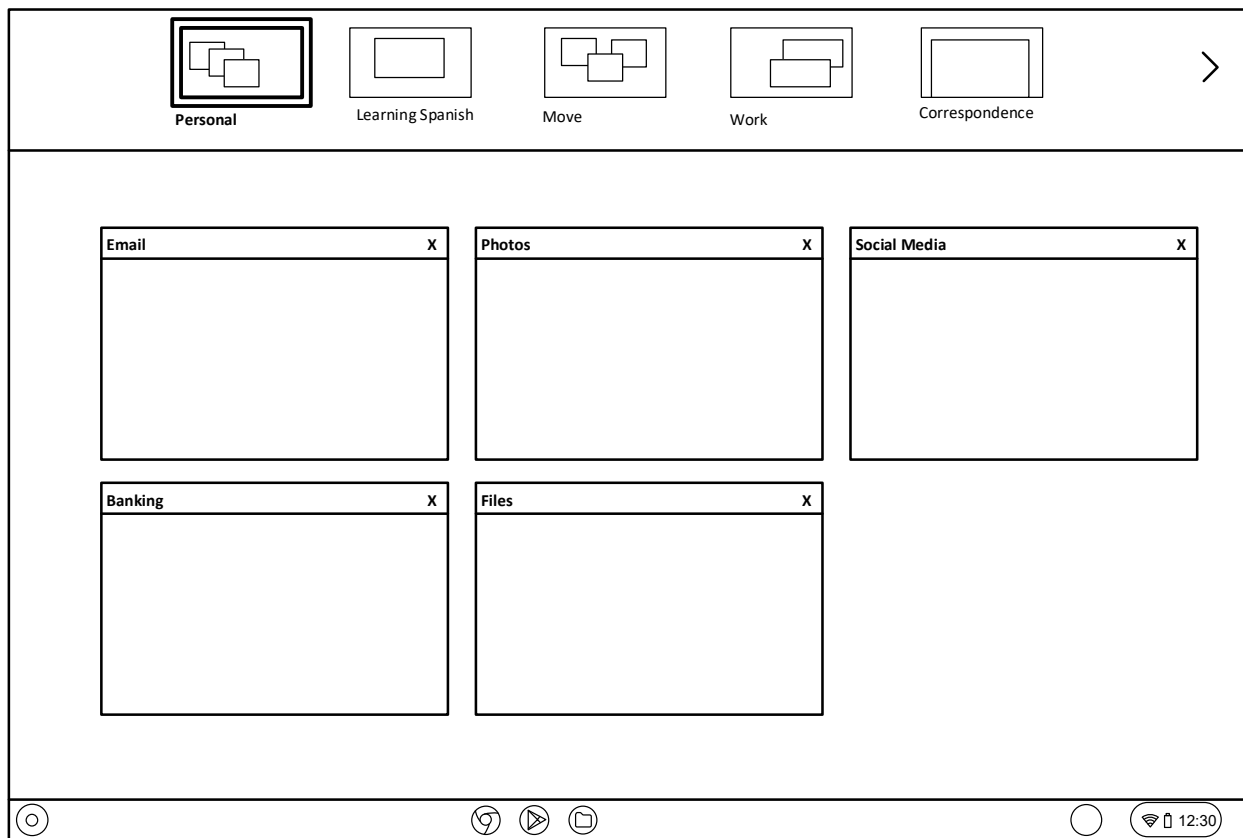

Figure 1

The OS may add the bar to the user interface (UI) in response to the creation of a virtual desk, to provide easy access to the virtual desks. Additional icons representing additional virtual desks may be added to the bar as virtual desks are added. Highlighting surrounding the first

virtual desk in the arrangement of virtual desks shown in Figure 1 provides an indication of the active virtual desk, or the selected virtual desk, with resources associated with the selected virtual desk displayed in a main portion of the screen. In some examples, the bar is a persistent bar which is displayed by default with the system UI. In some examples, an autohide option available in an overflow menu of the virtual desk bar (see Figure 5A) allows the user to hide the persistent bar. In some implementations, virtual desk functionality may be accessible in other ways, in addition to and/or instead of via this type of persistent bar. For example, the virtual desk functionality may be accessible via a desktop icon, a launcher search, a pinned item and the like.

As noted above, the OS provides for the storage of the virtual desks and the resources associated with each of the virtual desks, including the arrangement of the resources associated with each virtual desk. By storing this information associated with each of the virtual desks at logout, or shutdown, or a system crash or reboot, the OS can restore each of the virtual desks at startup, the initiation of a new session, etc., including the sizing, placement, and arrangement of applications, tabs, windows and the like, content and/or user entries included in each of the tabs, and other such features associated with the virtual desks that will facilitate user re-engagement. In some examples, the OS provides a reminder of virtual desks that are available to the user at the initiation of a new session such as, for example, a prompt, a menu, an animation and the like.

Figures 2A-2D illustrate icons representing the virtual desks arranged within the shelf or bar. The icons representing the virtual desks can include a name associated with the virtual desk, a preview of resources associated with the virtual desk, and the like. In some situations, additional virtual desks may be available, but the shelf cannot accommodate a display of all of the virtual desks at one time. A user input at the scroll arrow at an end of the shelf, as shown in Figure 2A, may cause the virtual desks to scroll, so that icons representing the additional virtual

desks can be displayed in the shelf, and are easily accessible to the user for selection. Figure 2B

illustrates a scrolling of the icons representing the virtual desks in response to a window dragged

on top of the scroll arrow. In Figures 2A and 2B, names are associated with each of the virtual

desks. In Figure 2C, the icons have been updated to provide a desk preview, and an option to add

a new desk is available for selection. In some examples, the OS may allow the user to further

customize the virtual desks by selecting items such as wallpaper for easy identification of the

virtual desks. As a new virtual desk is created, the OS may prompt the user to provide a name for

the new virtual desk, and to enable a preview of the new virtual desk, for displaying with the

icon. The OS may otherwise apply a default name and/or a default background to the virtual

desk. The icons representing the virtual desks may be rearranged within the shelf by, for

example, selecting the icon and dragging it to the desired position within the arrangement of

virtual desks in the shelf, as shown in Figure 2D. The virtual desk bar may be interactive, in that

applications, tabs, windows and the like may be dragged from the main display area and dropped

into one of the virtual desks displayed in the shelf, to add the resource to the virtual desk.
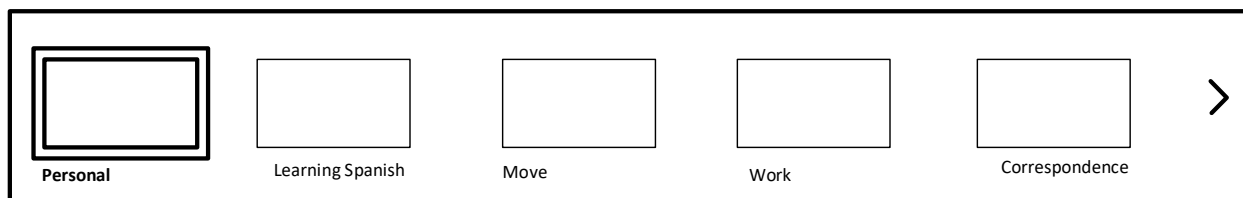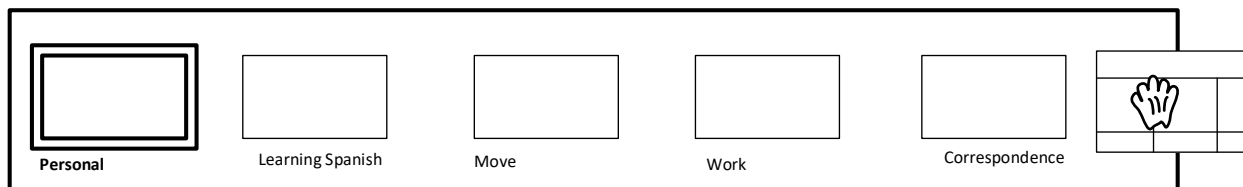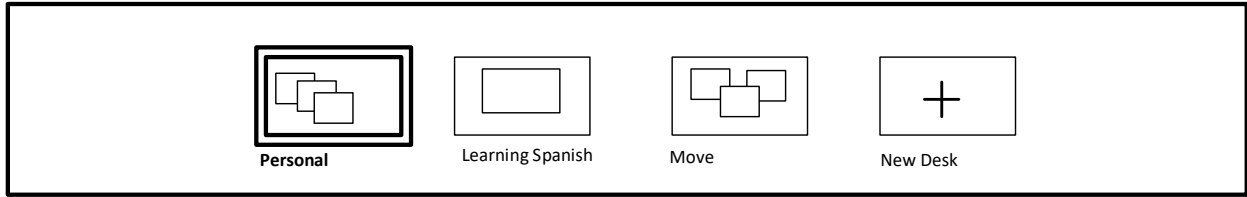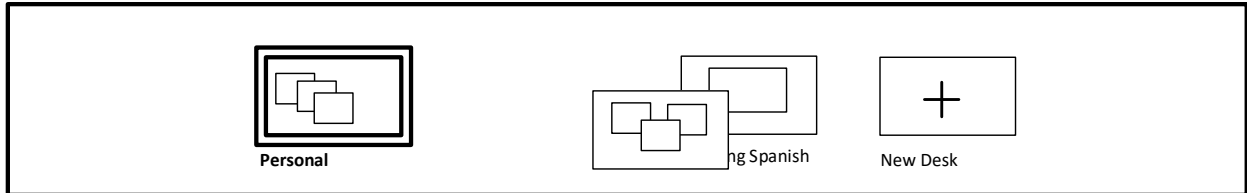

Figure 2A

Figure 2B

Figure 2C

Figure 2D

In some examples, a swiping gesture, for example, on a touch input pad on the base of a computing device, on a touch sensitive surface of a display and the like, may be used to navigate from one virtual desk to another, as shown in Figure 3.
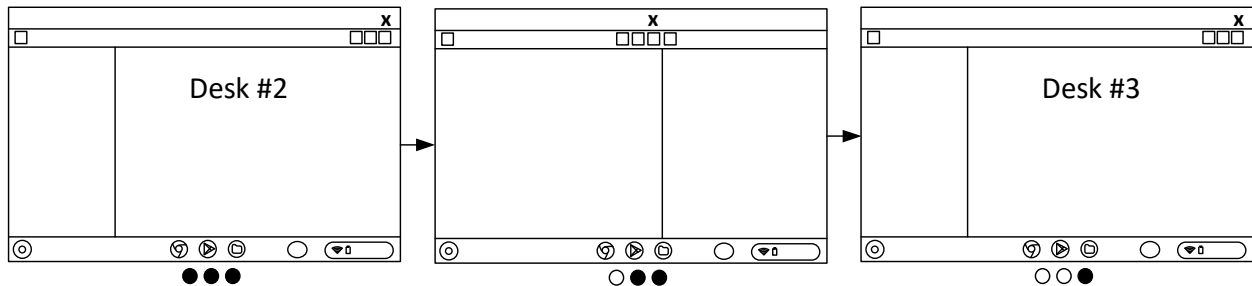

Figure 3

Contextual menus may facilitate resource management amongst windows such as allowing windows and tabs to be assigned to a virtual desk, moved/reassigned to new virtual desks, shown in all virtual desks, and the like. For example, a right click on a tab or window may trigger display of a drop down menu, providing for user selection of an option to move the tab or window to another virtual desk, as shown in Figure 4A, or to include the tab or window in all virtual desks, as shown in Figure 4B. In some examples, the user can customize a system setting to show all windows that are open on all desks or on a current desk, as shown in Figure 4C.
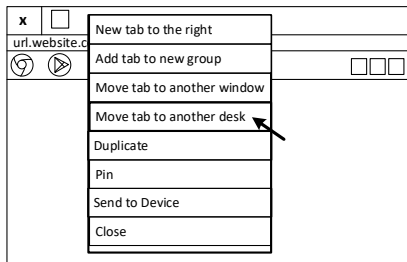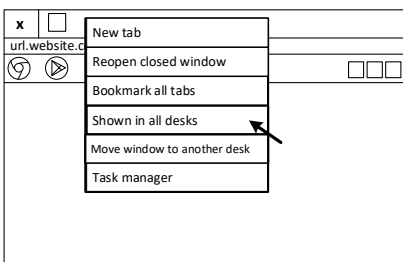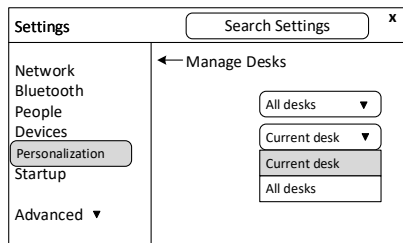
Figure 4A

Figure 4B

Figure 4C

In some examples, the OS can provide information that facilitates user management of the virtual desks, and the resources associated with each of the virtual desks. For example, the OS can provide access to information regarding usage of the virtual desks, usage of resources within the virtual desks, suggestions for new virtual desks and associated resources, and other such usage-based information. For example, insights into usage can be accessed from an overflow menu in the virtual desk bar, as shown in Figures 5A and 5B. In some examples, the OS can invoke a machine learning model that detects stale, or unused, or irrelevant virtual desk contents and/or virtual desks, and prompts the user to close those resources, delete those resources, move those resources to another virtual desk and the like, as shown in Figure 5C.
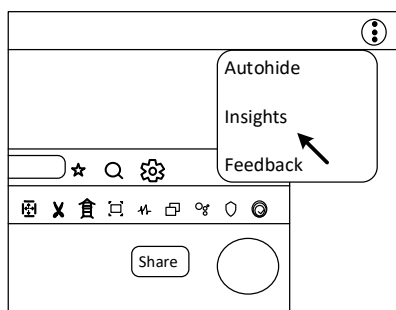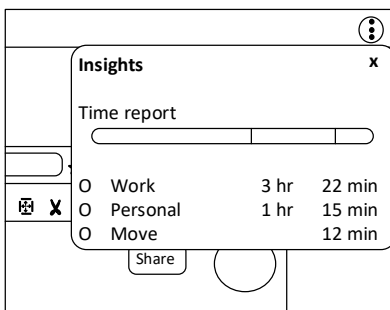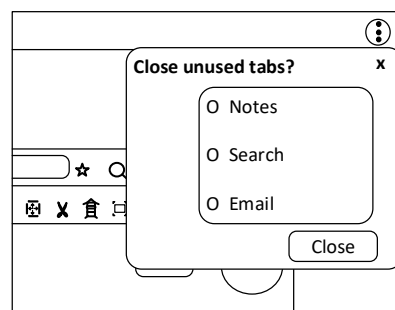

Figure 5A

Figure 5B

Figure 5C

In some examples, the OS provides for the synchronization of the multiple virtual desks across multiple user devices. For example, virtual desks may be stored at the end of a session as described above, and restored at the initiation of a subsequent session. Restoration of the virtual desks in the configuration of the desks at the end of the previous session may include all of the stored resources and arrangement of those resources (applications, tabs, windows, etc. in the

stored arrangement/size etc.). In some examples, the virtual desks and associated configurations may be stored in connection with a user account or user profile. The OS may enable detection of the user accessing the user account from a different device, and may restore the virtual desks, including the respective stored configurations, in response to the detected user login. The synchronization of the virtual desks across multiple different user devices allows the user to maintain organization, consistency and productivity while using multiple different devices.

In some examples, the OS provides suggestions for new virtual desks based on, for example, observed usage including frequently accessed applications, windows, sites, files and the like. For example, the OS may generate a prompt, as shown in Figure 6A, and/or a listing of frequently and/or recently accessed resources and suggestion(s) for addition to existing virtual desk(s) and/or creation of a new virtual desk, as shown in Figures 6B and 6C. In some implementations, the creation of a new virtual desk may be facilitated by, for example, one or more templates available to the user, as shown in FIG. 6D.
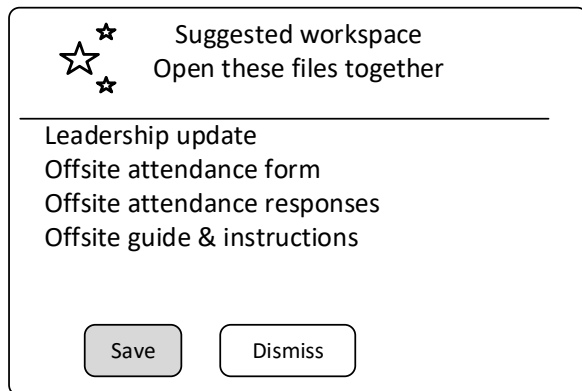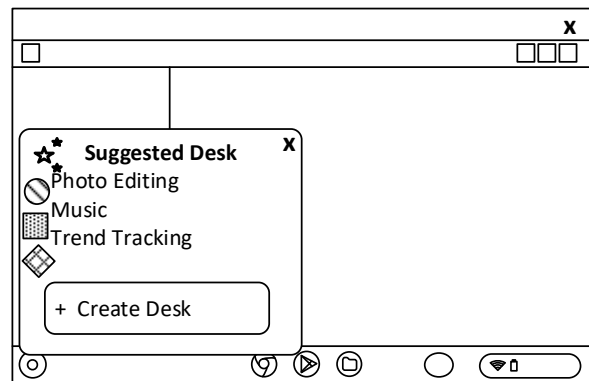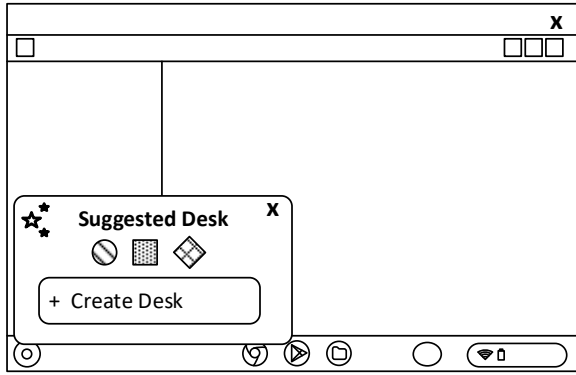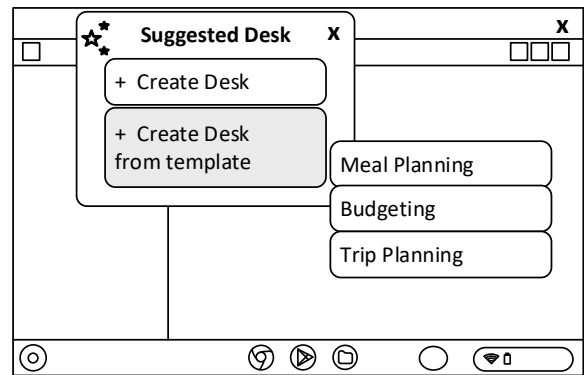

Figure 6A

Figure 6B

Figure 6C

Figure 6D

In some examples, the virtual desk bar is temporarily hidden and a new virtual desk bar is displayed as shown in Figure 7B, in response to a user input to create a new virtual desk, as shown in Figure 7A. The OS displays a floating bar, as shown in Figure 7C, allowing the user to access and control existing virtual desks, manage resources associated with the virtual desks, and determine content to be moved to the new virtual desk. In some examples, the OS allows the user to search for related items in the virtual desk, and look for relevant resources (applications, files, tabs, windows and the like) in the virtual desks, as shown in Figure 8A, to facilitate the management and organization of the virtual desks. As shown in Figure 8B, the OS can also identify content that is already included in (another) virtual desk, duplicative content in a virtual desk, and the like.
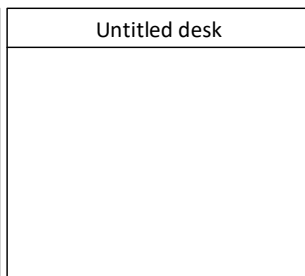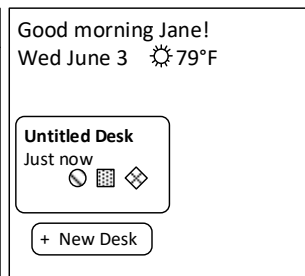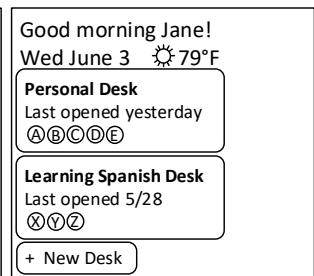

Figure 7A
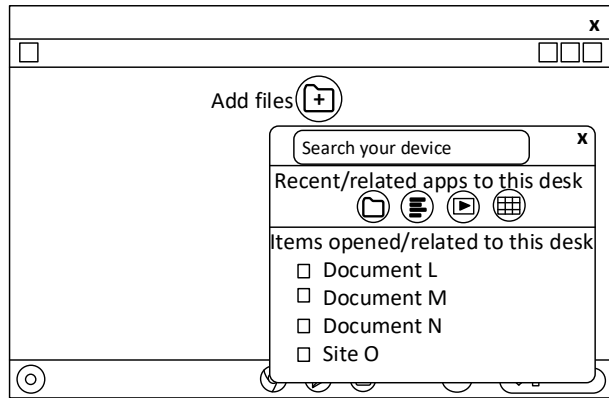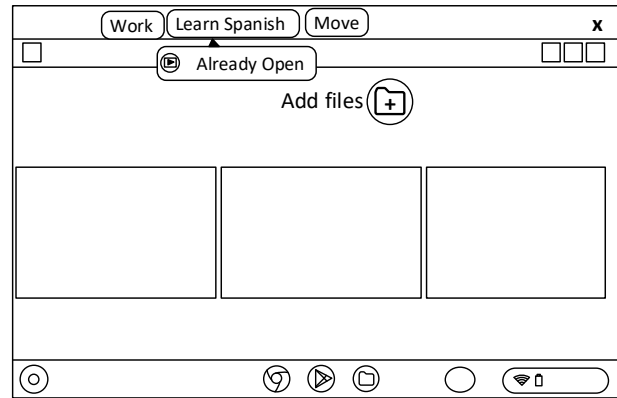
Figure 7B

Figure 7C

Figure 7D

Figure 8A

Figure 8B

A system and method including an OS that provides for the creation, saving and restoration of multiple virtual desks as described above allows users to group, save and access related resources, applications, windows, tabs, files and the like, thus improving organization and efficiency. The multiple virtual desks are stored at the end of a session, including, for example at logout, shutdown, in the event of a system crash, and the like. When accessing one or more of the multiple virtual desks in a subsequent session, the multiple virtual desks are restored to a configuration corresponding to the state at the end of the session, and/or at the state in which the virtual desk was last accessed, including restoration of each of the resources associated with the virtual desk, restoration of content within each of the resources, restoration of an arrangement, relative size and placement of the resources, and the like. Restoration of the virtual desks in this manner allows the user to quickly and easily resume engagement with the contents of the virtual desk. Synchronization of the multiple virtual desks across multiple user devices further improves user engagement and productivity in that the virtual desks in the stored configuration are accessible to the user across numerous devices. The OS provides tools to streamline the creation, population and management of the virtual desks, thus improving user organization and productivity, and also benefitting resource management at the OS level.