

[Implementing Outlook in Non-Persistent Virtualized Environments](#)

Poor email client performance is one of several serious problems that has prevented enterprises from fully adopting non-persistent virtual desktop models. Performance issues in email include long lag times and hanging while downloading and opening emails, time-outs when opening calendar items, and extremely slow response while inbox searching. For administrators, the various workarounds to this problem can result in dramatically increased server utilization, increased cost, and ongoing poor and inconsistent performance for end users.

This FAQ addresses the use of Profile Containers to enable Cached Exchange Mode in non-persistent (pooled) VDI, RDSH and XenApp. In general, this approach covers both internally managed Exchange, as well as externally hosted Exchange through 3rd party providers and through Microsoft, via Office 365 subscriptions of hosted Exchange for Business.

FSLogix Apps Profile Containers move the entire User Profile, including the registry, to an in-guest container, which appears to be fully integrated with the local system. This approach completely eliminates the need for Folder Redirection or other network-share based workarounds which can generate saturated server work queues and network links during boot storms caused by large numbers of users simultaneously logging on during peak periods of a normal work day. User email performance is returned to 'normal', or indistinguishable from running Outlook in a well-optimized local computing environment.

Cached Exchange Mode (CEM) versus Online Mode

"Cached Exchange Mode was introduced in Outlook 2003 to give users a seamless online and offline Outlook experience. It also insulates users from network latency and connectivity issues while they are using Outlook. By caching the user's mailbox and the OAB locally with Cached Exchange Mode, Outlook no longer depends on continuous network connectivity for access to user information. While connected, Outlook continuously updates users' mailboxes so that the mailboxes are kept up-to-date. If a user disconnects from the network—for example, by removing a portable computer, such as a laptop, from a docking station—the latest Outlook information is automatically available offline. Online Mode works by using information directly from the server, and, as the name implies, it requires a connection. Mailbox data is only cached in memory and never written to disk." [https://technet.microsoft.com/en-us/library/jj683103\(v=office.15\).aspx](https://technet.microsoft.com/en-us/library/jj683103(v=office.15).aspx)

Cached Exchange Mode is enabled through a configuration option in the Outlook client which directs Outlook to locally cache a copy of a user's mailbox. The cached copy is stored in a .OST file, allowing the Outlook client to perform all client interactions using the local mailbox copy, rather than traversing the network for mailbox operations. According to Microsoft, Cached Exchange Mode is the preferred configuration in Outlook 2013, and for optimal performance should be used in almost all use cases.

In Online Mode, the Outlook client is literally performing all operations against the online copy of the mailbox and must maintain a connection to the Exchange Server at all times. Online Mode is generally associated with bad performance, and often considered ‘unusable’ for users who are used to Cached Exchange Mode. High latency or inconsistent network connections can exacerbate performance problems with Online Mode, and are often difficult to troubleshoot since they can extend beyond the internal enterprise network infrastructure.

Microsoft recommends Online Mode for the following configurations: Kiosk environments accessed by multiple users, heavily regulated compliance or security environments where data must not ever be stored locally, large mailboxes on computers that don’t have sufficient local storage space, and Virtualized or Remote Desktop Services environments in which disk size or disk I/O limitations prevent storing and accessing multiple user’s mailboxes on a shared system.

The Problem in Virtualized Environments:

Although Cached Exchange Mode is by far the preferred client configuration option for enterprise users, implementing CEM in virtualized workspaces can prove problematic to architect with current infrastructure options.

Remote Desktop Services: Most medium to large scale RDS implementations do not assign users to specific servers, and assume that users can establish a new desktop session on n number of available servers in a pool or farm. In this configuration, the OST file cannot be stored locally, since the user will likely not access this same server for their next session. Microsoft also recommends against CEM in a shared RDS environment, due to the disk space required for cached OSTs.

Virtual Desktops: In non-persistent, or pooled virtual desktops, the user workspace is dynamically created for each new session and generally discarded at logoff, preventing permanent local caching of the OST.

The Solution:

Starting with version 2.0, FSLogix provides a feature called Profile Containers. Profile Containers are local or remote volumes, which eliminate the need for folder redirection or Roaming Profile optimization, allowing users to have a consistent, familiar, workspace experience with no limitations on the size of the profile or the size of any individual files. This approach solves the problem of large files and OST.’s in VDI and RDSH. Users and businesses increase productivity by having access to their unique work environment on any device. Unlike other products, FSLogix provides this solution without the overhead of remote management servers and additional configuration databases.

Profile Containers are a new architectural approach to address this problem. Instead of placing all of the user’s files on a network share like in the redirected files approach, FSLogix encapsulates the entire profile -including the registry- in an in-

guest container. This advanced filtering approach reduces the maximum amount of resources required to process user profile data and eliminates the need for legacy profile products and folder redirection. User profile performance is indistinguishable to local, yet administrators receive the benefits of centralized profiles, including easy off loading for data retention and compliance, with little or no ongoing administration.

Common Workarounds:

The following approaches attempt to solve some or part of the problem, but do not restore full email client performance as can be achieved using FSLogix Apps Profile Containers.

Redirecting OST File to Users Home Drive

Redirecting the OST files to the users' home drive can improve performance over Online Mode, but will not restore the full performance of having a local OST and introduces other performance and design challenges. A basic issue with the users' home drive is that it may be in a different datacenter than the virtual desktop, or the site simply doesn't use home drives.

[There is some question](#) as to whether this method is fully supported by Microsoft, but more importantly, an even greater foundational performance problem exists with this approach - a substantially higher amount of server and network overhead is created when accessing and managing a file from a network share.

Example: Let's say that a user sends an e-mail message to 500 users within the company. All of these users have their e-mail delivered directly to their PST file, which is stored on the File Server. Some of these 500 users may need to extend their PST files to receive it. To extend a PST, an extra allocation on disk has to be made via NTFS. This locks out the whole volume while free space is allocated and the Master File Table (MFT) is updated. While this is happening for each user, all I/O for the other 499 users is on hold.

Allocating free space can take an extended time, especially if the disk is fragmented. Now factor in multiple users extending their PST's in the same timeframe, and significant periods of MFT lockout might be observed, which in turn is seen as inability to access any other file on the volume, resulting in queuing in the server service work queues, and sometimes SRV 2019, 2020, 2021, or 2022 events being logged. This scenario might overload the disk(s).

In the FSLogix container model this problem is eliminated since the operation is serviced locally - the user session sees the Profile Container as part of the locally attached system (as if it were just another local disk), and through advanced filtering techniques will generate only the same, very limited I/O as if the profile and OST were on the local system.

SSD and High Performance NAS

Implementing SSD and high performance NAS solutions can dramatically improve overall system performance, however they do not remove the bottlenecks and design inefficiency generated by folder redirection and other workarounds. Using high performance NAS along with Profile Containers helps generate the maximum ROI from your infrastructure investment, remove system design flaws, and creates an optimal environment for end users, with an elegant, streamlined system approach.

Faster Networks

Increasing the bandwidth of your network connection between your Outlook clients and hosted Exchange provider is an expensive option that will improve overall performance of Online Mode, but will not likely restore performance to local users expectations. Basic functionality for power users (users with large calendars) can still be impacted with time outs and significant lags. While faster networks can always improve overall system performance, they are not a replacement for Cached Exchange Mode, and add cost without addressing the root cause.

Outlook Web Access

OWA is essential web mail for Outlook and has the same core performance limitations as Online Mode. While OWA has improved significantly, many enterprise applications leverage Outlook add-ons to function properly (Microsoft Dynamics CRM, System Center Service Manager, etc). If your enterprise does not already require these types of add-ons today, it may in the future. Several mail features that have become standard in the enterprise are not currently supported on OWA (calendar preview in meeting requests, distribution list expansion and moderation, etc),

Copying Small OSTs During Logon

Outlook 2013 introduces an OST 'cache slider' which makes it easy for administrators to force OSTs of a specific size. During logon this file can be copied into the local session. There are at least two significant problems with this workaround. First, copying any files into the new user session will negatively impact logon time, and even a size-restricted OST file can be a very large file to copy. Second, many user groups in a typical enterprise will require more than 1 to 2 months of history in their OST. Aside from the impact to the general user community, groups like Legal, Purchasing, and Accounting / Finance will often require multiple quarters of inbox history to be easily and quickly accessible.

References:

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