CHAPTER 17

Horizon Troubleshooting

Although this chapter is titled Horizon Troubleshooting, we are going to also look at a more proactive approach. This will enable you to provide a more proactive approach to the monitoring of your environment and allow for you to preempt any potential issues rather than wait for them to become real-life issues that affect the performance of your end users.

The one big takeaway you should have learned by reading this book is that a successful virtual desktop or end-user computing project is made up of multiple components, and its success comes down to delivering a good user experience.

As such, you need to have the tools to enable you to diagnose and fix issues within your environment quickly and before those issues affect more users. This, if there were any, is one of the pitfalls with this type of solution. If there is an issue with the infrastructure, then it could potentially affect hundreds, if not thousands, of users, whereas with physical desktops, if a desktop breaks, it affects a single user. That is of course just so long as it isn't network related or an online service that is unavailable.

In this chapter, we are going to discuss troubleshooting tips using some of the available tools but more importantly look at how you can proactively monitor your environment. We will look at this by discussing three specific areas:

- General troubleshooting tips
- Managing specific issues
- Proactive monitoring and management

We will start by looking at some of the general troubleshooting tips before drilling down into some of the more specific information.

P. von Oven, *Mastering VMware Horizon 8*, https://doi.org/10.1007/978-1-4842-7261-9_17

General Troubleshooting

In this first section, we are going to take the cliched helicopter view of the environment and look at the entire environment to understand any potential issue before we start to look at the specifics of whether it is a CPU issue, a disk issue, or something else.

Quite often with VDI, especially when it is a new implementation, when a fault occurs VDI will become the point of blame. That then leads to the IT teams spending time trying to troubleshoot an issue with the VDI implementation rather than understanding what the issue actually is and looking at the bigger picture.

What also typically happens at this stage, particularly if it is a perceived performance-related issue, is that IT teams throw more resources at the problem. For starters, they may increase the number of CPUs and memory that the virtual desktop machine has been configured with and see if the problem goes away.

You have to remind yourself that VDI and Horizon delivered desktops and applications are just one component in a much larger solution. Quite often, it turns out that the issue is related to the network, storage, or an individual application. Moreover, the fault would have occurred in a physical environment too, and VDI and Horizon have nothing to do with it.

When a user reports an issue, or you notice an issue within the infrastructure, you will need to think logically as to which component within the infrastructure is going to be likely the cause and where you are going to start your troubleshooting journey. Maybe it is a storage issue, or maybe even it's a Windows issue and not anything to do with VDI at all!

How Many Users Are Experiencing Issues?

We have already touched on this subject, and the question you need to ask before embarking on troubleshooting is whether an individual user is experiencing the reported issue or whether it is a whole group of users being affected.

What we are trying to establish here is whether this could be infrastructure related and therefore multiple users will report the same problem or whether it is something an individual user is experiencing. If it is an individual user, then you need to understand what they were doing when they experienced the issue.

For example, are they connecting from the same location using the same device? Have they installed something or configured something on the desktop? Not that they should be able to do this, but there may be some use cases where they can.

If you suspect it is an issue with their individual desktop, then you can simply get them to log out and log back in again upon which they will be allocated and built a new desktop. This is one of the major advantages of deploying a stateless desktop model with Instant Clones and floating desktop assignments.

Should the issue continue after an OS refresh, then you would need to look at the configuration and the apps running on the desktop. If you need to apply a fix, you can update your gold image and push out an update. That will also ensure no other users will have the same issue.

Troubleshooting Performance-Related Issues

Performance issues are probably the biggest issues faced when working with and troubleshooting virtual desktop solutions, with the network likely to be blamed as the main culprit for any poor performance. However, before you then go and spend hours looking at network monitoring tools and other analyses, you need to step back and understand whether it really is the network.

As the remote desktop sessions are being delivered over the network, that is the reason the network is often seen as the issue; however, poor performance could have another root cause, and the network in this instance is just the messenger. But that is not to say there aren't network issues causing poor performance; the takeaway here is to not jump straight to blaming the network.

User Performance Issues

Most issues, in the first instance, will be reported by end users. The key thing here is to understand the issue as typically an end user will call the help desk and complain that their session is slow and no other information.

When an end user reports issues relating to poor performance, then you need to try and get them to be more specific. Ask them whether it is their session that is generally slow with everything they do or whether it is down to something like an individual application that is slow, or it is taking longer than expected to log in. The other key thing is whether this is a new issue or they have always experienced this.

It is also useful to keep a log of the issue, noting the time and date the issue occurred. If you are using some of the monitoring tools that we will cover later in this chapter, then you will be able to use these tools to reference what exactly was happening within the environment when the issue occurred.

As part of the general troubleshooting, it is also useful to understand whether the end user is doing something different. Although this may sound obvious, the end user won't usually mention the fact that all was fine when working from the office and connected to the network, but the issue occurs when they connect from home, upon where they suffer performance issues, for example.

In this example, the environment and location have changed which is a key piece of information to know before you go off examining the internal network when the issue could be down to the end user having slow home broadband. The fix may be that you change a policy setting that disables features that demand more network bandwidth.

Non-virtualized Performance Issues

By non-virtualized performance issues, we mean issues that do not relate to the virtualization layer, such as the virtual desktop machines or the hypervisor itself.

We are specifically talking about performance issues or other issues that would potentially occur on a desktop regardless of whether it is running in a virtual environment or not.

Things such as

- Logon time taking too long.
- Applications freeze or crash.
- Applications take too long to load.
- OS crashes such as blue screens.
- Applications run slowly.
- Permission errors.

These issues are not exclusive to a virtual environment; however, as they *are* running in a virtualized environment, then troubleshooting and resolution may be much easier.

Take an example of where the OS crashes or the virtual desktop machine becomes unresponsive. Rather than spend time trying to understand why, the end user can simply log out and log back in where they will receive a brand-new virtual desktop machine built from the clean image. If this issue affects more users, then consider patching your gold image, and when it has been tested, you can easily roll out the new image to all your end users.

If other changes are required, whether OS or application related, then these can very easily and quickly be rolled out.

The important point here is that you need to understand that these types of generic desktop issues will still exist whether you are running virtual or physical desktops and that you shouldn't automatically blame the virtual infrastructure as happens all too often.

As we have said, in these cases where end users experience issues, virtual desktops are your friend. Don't forget about troubleshooting general desktop support issues and spending far too much time examining your virtual infrastructure looking for issues when the answer may be as simple as a Windows OS or application issue.

Bandwidth, Connectivity, and Networking Issues

Networking issues are often some of the hardest to diagnose and can quite often be intermittent and depending on how many users are online and what they are doing at the time can all affect the network performance.

The best way to understand these usage patterns to help identify when there is an issue is to work closely with the networking teams and ensure you deploy some form of end-to-end monitoring solution.

Most of your end users will most likely be connecting over your local network or wide area network, meaning that you shouldn't have too many bandwidth issues given the network requirements were part of your overall design, and the network has been designed to deliver these requirements. If you do start to experience network performance issues, then start with looking at the following:

- Has anything on the network changed? If the network team are a separate team, have they implemented or changed something such as new firewalls, VLANS, or bandwidth restrictions?
- Is the end user connecting via a wired or wireless network? Perhaps, they are not close enough to a Wi-Fi hotspot, or their device has an older wireless protocol running.
- Have you configured QoS on your switches?
- Is the network currently reliable in general? Maybe this is not a virtual desktop–related issue, and it is just a network issue experienced by everyone.
- Are you seeing any dropped packets? This could indicate a failed switch or router or maybe a faulty cable. If it is from the client device, maybe the client has a poor Wi-Fi signal.

- Is the latency as expected?
- Check your design in terms of required bandwidth. Even on the LAN in enterprise environments, bandwidth could become an issue. Check your design and that you have configured enough bandwidth. Monitor end-user usage. Is an end user running something new that is consuming more bandwidth than your design catered for?
- Are you routing between different networks? If so, do your routers deliver suitable performance?
- Do you have any load balancers in place? Are the load balancers sized correctly for your environment, or are they causing a bottleneck?

When your end users are remote and connecting externally over the Internet, for example, it can become far more difficult to troubleshoot or guarantee connection quality and performance.

For remote or branch offices, ensure that the Internet connection is sized correctly, and wherever possible configure QoS for the protocol end to end. You should also configure the protocol to suit an environment that has reduced bandwidth. Turn off some of the higher-end graphics capabilities, for example.

It is also worth looking at the relevant log files and events databases on both the end-user client devices and the Horizon Connection Servers. This may give you an indication as to what happened and when. This can correlate with what the end user was doing at the time so you can understand whether it was an actual issue, or the end user was doing something unexpected that required more network capacity.

There are also some hard faults that end users will report, rather than just complaining about slow or poor performance. The following are some of the more common faults that an end user could report:

- **Black screen on the client device after connecting**: This is caused by the PCoIP protocol being blocked. The end user can connect to the desktop, and the login process works as expected; however, when they expect to see their desktop, instead they will see a black screen. As the desktop is delivered via PCoIP, it uses port 4172 to display the desktop. If this port is blocked, then the pixels are blocked, and the end user sees a black or blank screen. You could consider allowing end users to change the protocol so they can try again with a different protocol.

- **Disconnections**: If end users experience high latency and dropped packets, then the result will be that the end users will be disconnected from their virtual desktop machine session. To help with end users reconnecting, you should consider configuring enough time for users to reconnect before they are logged out.
- **Poor resolution images**: If there is limited bandwidth, end users may complain about the poor quality of the images displayed on their desktop. You should consider using policies to configure the image quality based on end-user location. For example, if you use PCoIP, turn off build-to-lossless over Internet connections.

Next, we are going to look at compute issues.

Compute Resource Issues with CPU and Memory

The underlying virtual infrastructure hosting your virtual desktop machines, especially when it comes to CPU and memory, can have a negative impact on end-user experience should there be any issues.

At the start of the project, you would have conducted an assessment phase which would have provided you with the data to correctly size the environment in terms of the CPU and memory resources required. With this in mind, you should have allocated enough resources, plus a little extra to cope with the workload. So that means if you are experiencing CPU and memory issues, then there is a physical fault with a host server, or something has changed.

Also, as part of that initial assessment, you would have created a baseline which would have defined the key performance characteristics of CPU and memory utilization along with deeper metrics around CPU ready times.

When troubleshooting, you should refer to these baselines to enable you to compare what is happening now to what was happening before. This should help you identify the issue. Maybe more users than planned have been added, and therefore there isn't enough CPU and memory to cope with the additional capacity. Maybe applications have been updated or added that now require more resources.

There are several tools and solutions to help with this, such as vRealize Operations for Horizon that will help you understand performance utilization over time, or maybe a third-party product such as Liquidware Stratusphere which can provide both the baseline metrics (measured during the assessment phase) and the ongoing management of the entire user experience.

When it comes to memory utilization, the best practice is not to overcommit memory. You need to carefully consider how much memory you allocate to each virtual desktop machine. Then you need to size your hosts accordingly, ensuring that your total allocated memory is less than the total in your hosts. Also take into consideration what happens if a host fails or goes offline. Can the remaining servers manage the additional workload?

If you experience performance issues related to memory, it is worth checking to see if memory is being swapped with other virtual desktop machines. Is there any memory ballooning taking place? This would potentially indicate that you don't have enough memory allocated to the virtual desktop machine as it is having to page. Consider increasing the amount of memory to resolve this issue or look further into why more memory is being required and whether that was highlighted in your assessment data.

With CPU, you need to understand the CPU Ready metrics. The acceptable CPU Ready figures within your environment will vary based on what the end users are doing. As a rule of thumb, you need to keep the CPU Ready metric below 5% per allocated CPU, with a maximum peak of around 10%. Beyond that, then you could experience performance issues. Again, it is worth looking at your baseline assessment data and data from when the issue occurred to understand why this is happening. It may be a new application has been added which requires additional CPU capacity, or you have not sized the requirements correctly.

A number of these performance-related issues, as we have mentioned, could be classed as growing pains. Once the environment is up and running and users are onboarded, quite often we don't review any of the performance data until there is an issue. Your environment will have likely moved on from where it was at the point of the initial deployment, and it could be simply down to the additional users and new and updated applications that are causing the issues.

Disk Performance Issues

Disk performance is also a key component within your environment. You need to manage your disk performance as your environment grows and the demand for building Instant Clones increases as more end users are added.

One of the metrics to monitor for storage performance is the disk latency. How much latency is acceptable within your environment depends on your end users and what they are running on their virtual desktop machines. Disk-intensive apps will obviously suffer more from performance issues.

Generally, disk latency of less than 25 ms is acceptable, but that doesn't mean that an end user that has been using a desktop with sub 25 ms latency would necessarily be happy. If a user is running disk-intensive applications, then 25 ms may be simply not acceptable regardless. It's all about what is acceptable for the application to run and the end user's perception of acceptable performance.

Troubleshooting Horizon-Specific Issues

In this book, we discussed all the different components that make up your complete Horizon infrastructure. These are generally very reliable; however, they are not immune to failure or issues.

As part of your overall design, you will have designed out failure points wherever possible, ensuring that all your Horizon components and those supporting infrastructure components such as databases and Active Directory are also highly available.

Horizon Infrastructure Issues

To monitor your environment at a high level, you will see on the Horizon Console dashboard a section for System Health. If you click the **VIEW** button on this section, then you will see the following screenshot:

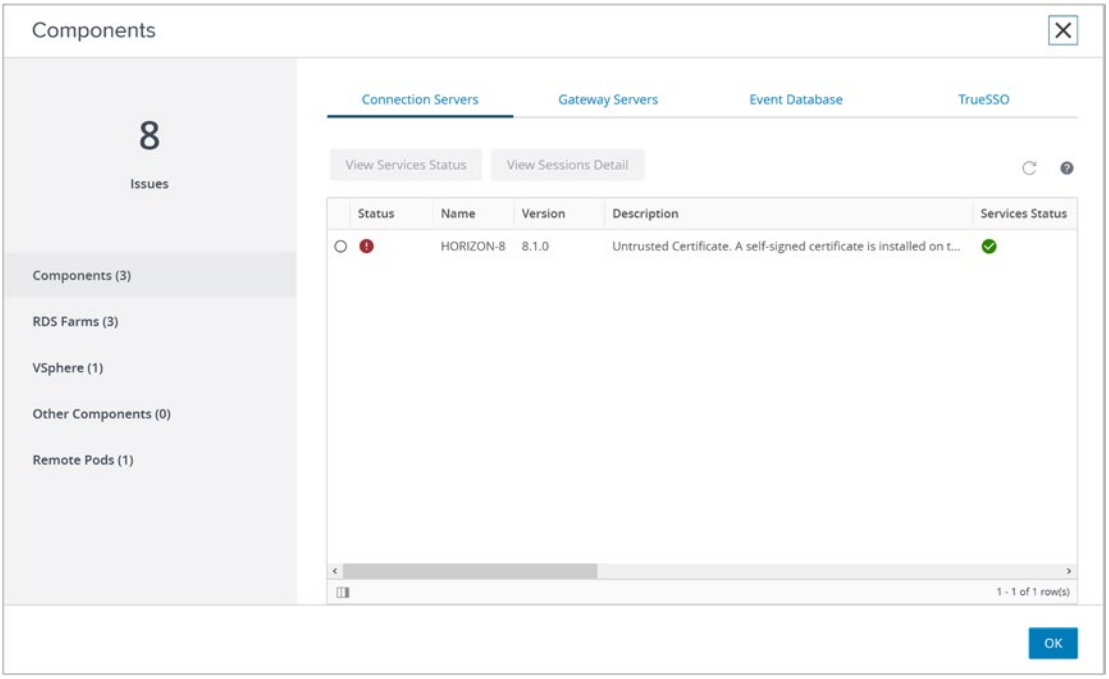

Figure 17-1. *System Health screen in the Horizon Console*

From here, you can quickly see which component has an issue from the status shown. In this example, the Connection Server called Horizon-8 has an issue with an untrusted certificate.

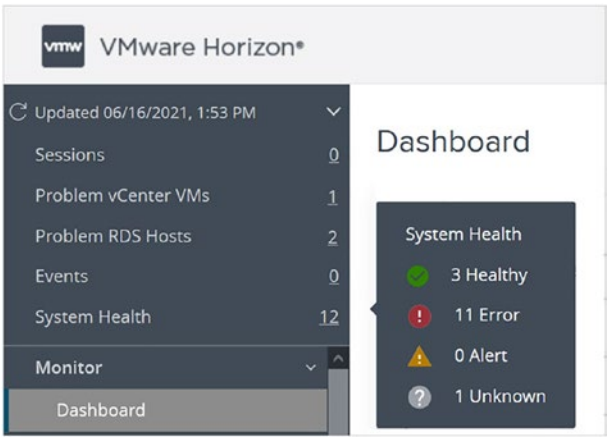

Figure 17-2. *System Health shown as red, amber, green*

Across the top, you will also see that you can check other components such as gateway servers and the event database, while down the side of the screen, you can select some of the other components such as RDS farms and your vSphere virtual infrastructure.

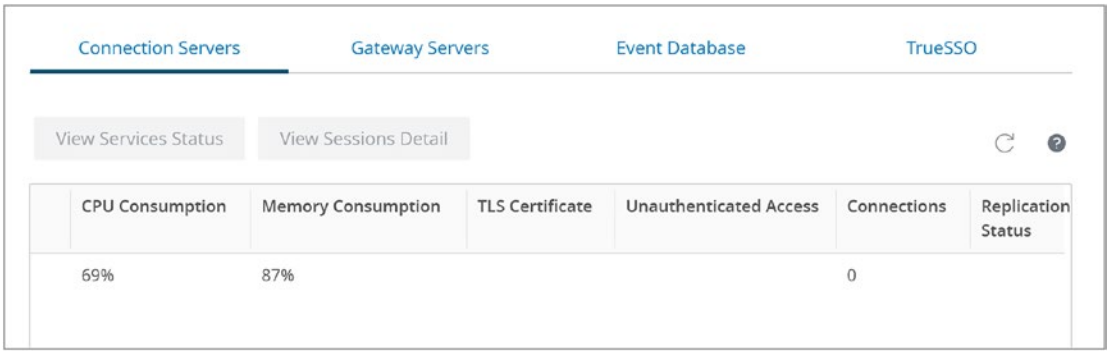

Figure 17-3. *System Health of a specific Horizon component*

As a starting point, when troubleshooting Horizon infrastructure, you should look at the system health information. Then from here you can start to drill down to what is causing the issue and then move on to fix the problem.

You also have the ability to look at the Horizon event database that will provide you with information about events that have occurred and been logged.

To access the event log, click Events from the first section of the top-left navigation menu pane. You will see the following example screenshot:

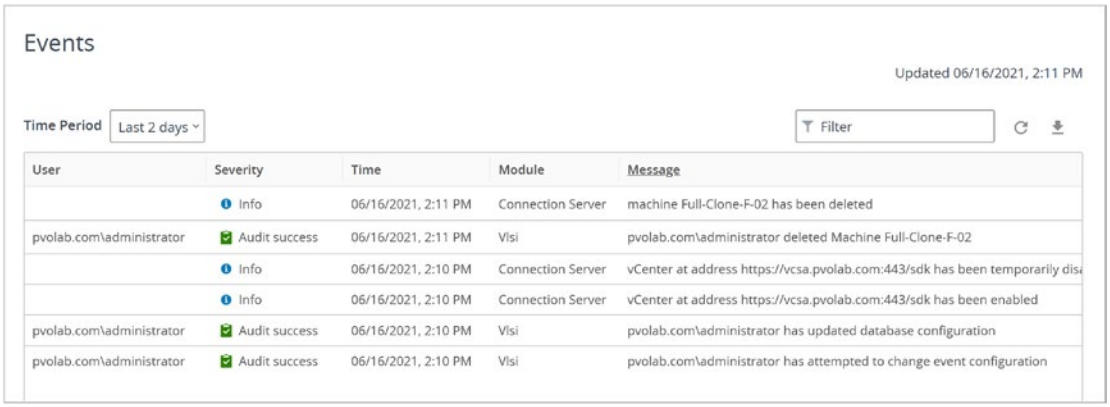

Figure 17-4. *Example event log from the events database*

If you have configured it, then you could also have access to syslogs from a Syslog server.

As well as checking the system health in the Horizon Console, you should also not forget the simplest of troubleshooting steps when troubleshooting your Horizon infrastructure, such as

- Are all the servers, desktops, infrastructure components, and hosts contactable on the network? Can you ping them?
- Are all the required services started?
- Is there a sufficient free resource on the hosting infrastructure?
- Is the memory and CPU utilization maxed out?

Don't forget the back-end infrastructure either. Is Active Directory available for end users to be able to log in to their virtual desktop machines? What about the other services and components that Horizon depends on? These all need to be considered when troubleshooting.

As part of your overall troubleshooting and remediation process, there may be issues that fall outside those that we have discussed so far or are visible from the Horizon Console or for the end user to see. These are typically more admin-focused issues.

Unfortunately, though, sometimes the corrective actions are not so straightforward to implement and need a more advanced approach perhaps using the command-line tools that we have covered in Chapter 16.

These issues could include

- Manual removal of a Connection Server after the loss of a component or OS corruptions when a new server is deployed. It would need to be manually removed using command-line tools from the inventory.
- Manual removal of desktops within a pool or the whole pool.
- Recovery of Horizon from a backup, whether a backup of the entire VM or an automated backup of the ADAM database.

There are many different scenarios which we aren’t going to cover in this chapter; however, they have been covered in Chapter 16.

In addition, there are some great knowledge base articles already available on VMware's KB site at the following address:

http://kb.vmware.com/

In the next section, we are going to look at the integrated Horizon Help Desk Tool.

Horizon Help Desk Feature

Horizon also has its own integrated help desk tool that enables you to search for a specific Horizon user and check their session status and the resources they are using.

The idea here is that should the end user call in to the IT help desk, you, as an IT admin, can quickly find the user and their session to quickly understand and identify the issue.

In the following example, an end user named Bob calls the help desk as he is experiencing issues with his session. As an IT admin, you would perform the following tasks:

1. Log in to the Horizon Console with the appropriate permissions to be able to use the help desk tool.
2. From the Horizon Console, expand the option for **Monitor** from the left-hand navigation pane, and then click **Help Desk**.
3. You will see the following screenshot:

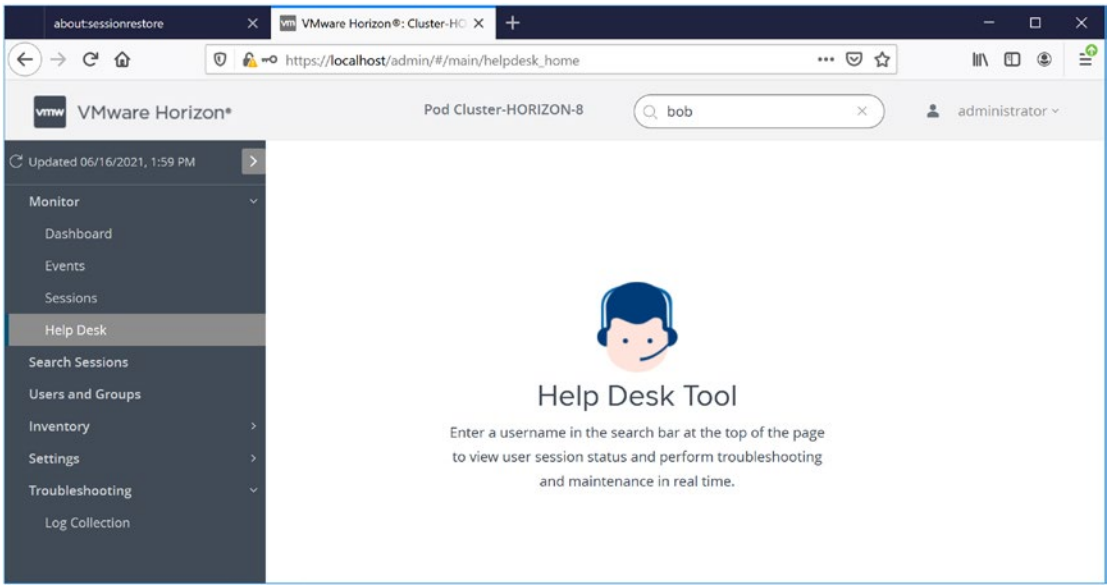

Figure 17-5. *Horizon Help Desk Tool main screen*

4. At the top of the screen, you will see a search box stating **User Search**. Type in the name of the user you want to search for. In this example, it is our user called **Bob**.
5. Now click the search button.
6. You will see the following screenshot that displays the results of the search. In this case, the user called Bob is displayed as a fully qualified name as shown:

Figure 17-6. *Selecting the end user*

7. Click the name in the results box, so **bob pvolab.com**.

8. You will now see the first screen which shows the sessions for the user Bob as shown in the following screenshot:

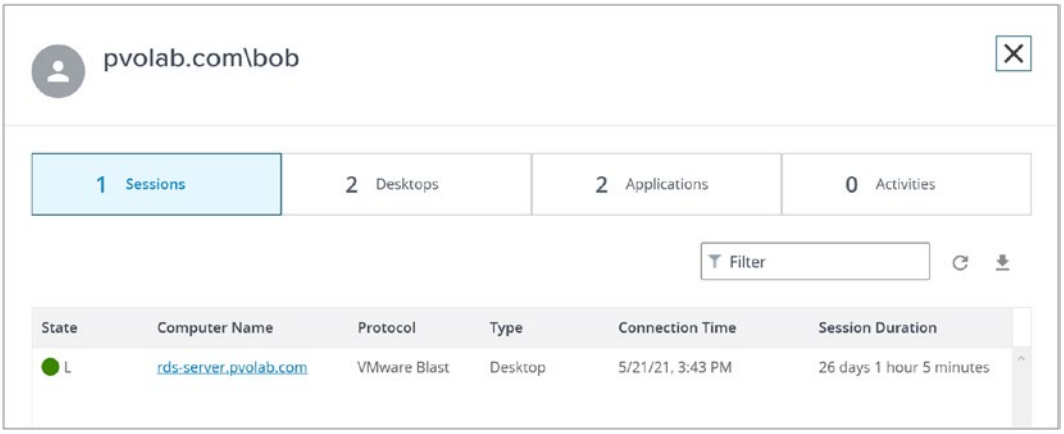

Figure 17-7. *End-user sessions displayed in the Help Desk Tool*

9. In this example, we can see that Bob has had a desktop session open and running as indicated by the green dot under the State heading. It also shows the name of the computer he is connected to and the protocol being used to deliver the session.

10. If you click the button under the **State** heading, you will be taken to a details screen for that session; the first shows the client details from where the end user is connecting as shown in the following screenshot:

Figure 17-8. *Client information using the Help Desk Tool*

11. If you scroll down, you will see the details of the virtual machine the end user is connected to. In this case, it is an RDSH Server that is delivering a published desktop session as shown in the following screenshot:

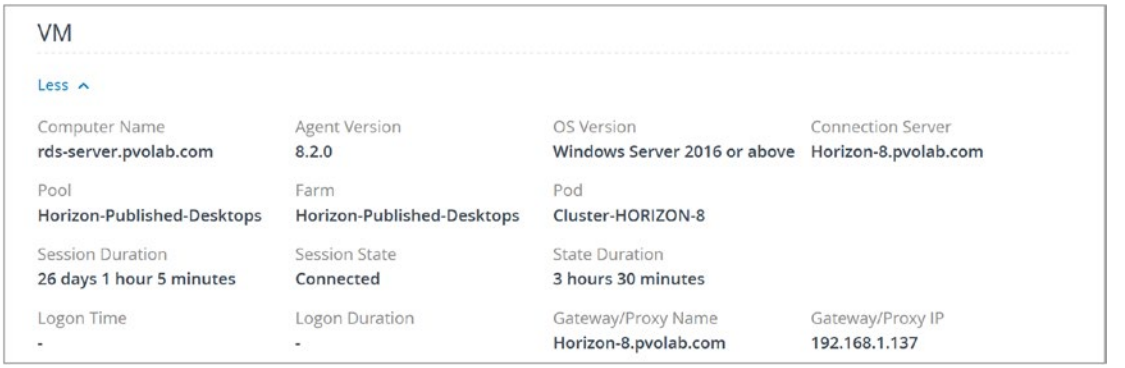

Figure 17-9. *VM information using the Help Desk Tool*

12. If you continue to scroll down, you will see the User Experience Metrics section that displays the protocol information with details on the frame rate and estimated bandwidth consumption as shown in the following example screenshot:

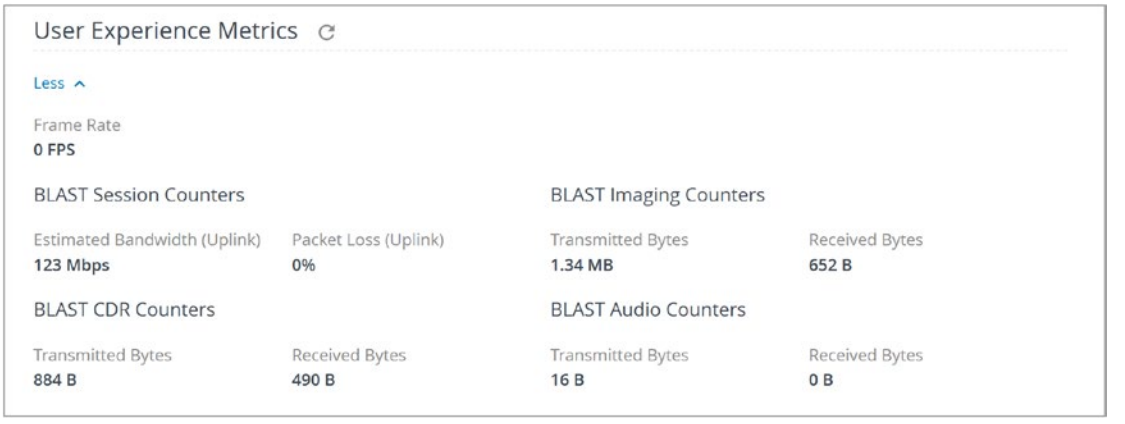

Figure 17-10. *User Experience Metrics using the Help Desk Tool*

13. Then finally on the details screen, you can see details of the resource utilization, detailing CPU and memory usage and network and disk performance as shown in the following example screenshot:

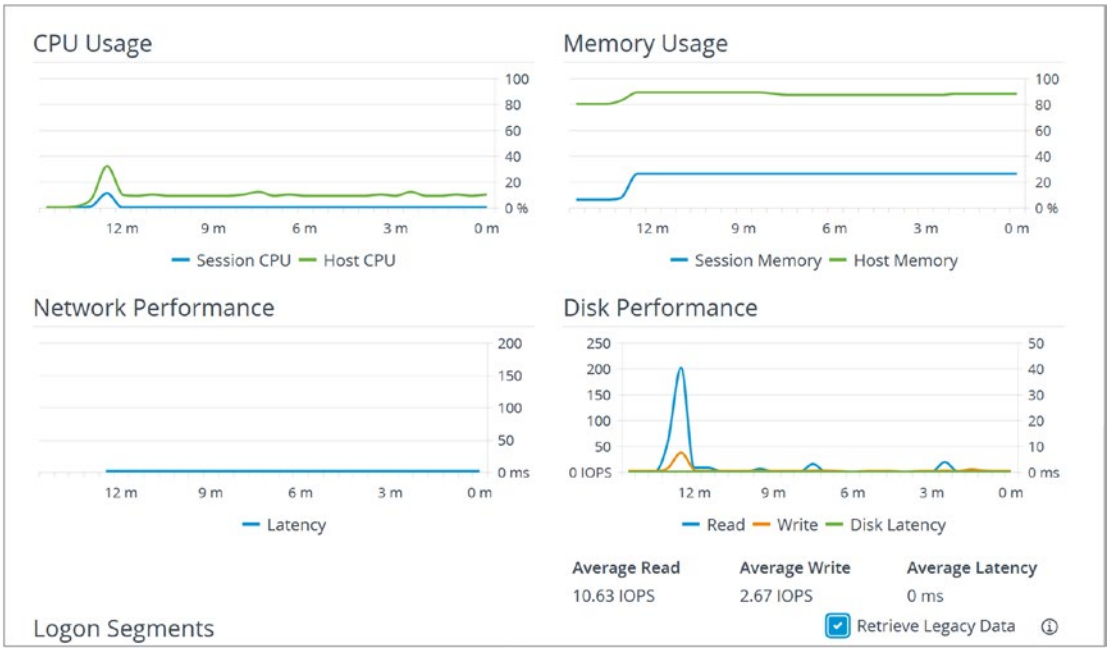

Figure 17-11. *Resource utilization using the Help Desk Tool*

There is also another free tool, the Horizon Helpdesk Utility, available from the VMware Flings website from the following link:

`https://flings.vmware.com/horizon-helpdesk-utility`

In the next section, we are going to touch on some of the place where you can find additional resources and information.

Additional Help and Support

In addition to the standard VMware documentation found on the VMware website, there are a huge number of resources available that discuss Horizon that can help if you have an issue with Horizon or just need some additional advice.

If you do however have an actual fault, then first and foremost, you should log a call with VMware Global Support Services (GSS) as soon as possible. Ultimately, VMware support will get to the bottom of any issues you are experiencing.

There are also many resources online such as blogs from experienced EUC experts. One of the most comprehensive sites is written by Carl Stalhood, and his site can be found here:

www.carlstalhood.com/

There is also the VMware Community which has a wealth of resources available at

https://communities.vmware.com

Finally, there are the EUC vExperts, a group of subject matter experts that specialize in VMware digital workspace solutions. You will find the EUC vExpert directory by following this link:

https://vexpert.vmware.com/directory/euc

Summary

In this chapter, we looked at troubleshooting issues within your Horizon environment by taking a higher-level general overview to what the issue is. This involved looking at the bigger picture to understand the issue better and not to instantly blame the VDI solution for whatever the issue is. We then went on to look at some of the more Horizon-specific elements such as CPU and memory performance, disk utilization, and networking limitations. This would help pinpoint and understand the issues the user is facing. It would help determine whether it is limited to a specific user or whether the issue is more widespread. The key takeaway here is to treat the issue like a desktop issue rather than a VDI issue. That isn't to say that the underlying cause could be down to the virtual infrastructure, but most likely that the problem would have occurred in a physical desktop environment too. Next, we looked at the Help Desk Tool that is built into the Horizon Console and how that can be used to help understand the performance and utilization of an individual end user's session.

Finally, we provided additional resources to help you solve issues and ask questions regarding the deployment of your Horizon environment.