STORAGE ARRAY MANAGEMENT WITH MOBILE APPS
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Vincenzo Orlando
SAN and Storage Administrator
enzorlando@gmail.com
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Introduction

Today's storage array vendors typically provide a combination of the following three solutions for management, monitoring, and reporting:

- Command Line Interface
- Web-based Graphical User Interface
- Client-based Graphical User Interface

These tools enable checking the health of a storage array and its components, configuration of logical devices, masking to external servers, displaying actual configuration, and so on.

However, using CLI on tablets and smartphones is not easy due to their small keyboards. Commands are quite long and it is hard to type them in with a touch keyboard.

Web-based GUIs are designed for PCs with MS Windows and Linux operating systems. They often use Java, don't require installation and, consequently, don't use a great deal of computing resources on the client PC. Despite a good browser, they have too many features to be used on a tablet.

Client-based GUI are designed for PC as well and are bound to a specific operating system version. They also require the installation of a client that uses computing resources on the client PCs.

There is a growing need for remote storage activities. Storage and SAN Administrators would like to be able to provide new logical volumes, create RAID groups, monitor system health, and perform daily activities as they would normally using a MS Windows or Linux PC, while avoiding the dimensions and weight of these devices.

Many administrators use a tablet or a smartphone to do several things, except for their Storage Arrays or FC Directors. While administrators would welcome the ability to satisfy a request for supply from their home, or look for an alert from a restaurant, or expand a logical pool from the park, this is not practical since only GUIs for MS Windows or Linux workstations are currently available.

None of the existing products has an App for Storage and SAN Administrators! Clearly, a GUI application for tablets and smartphones can improve the quality of their life!

This article focuses on generic issues about Storage and SAN Administrator apps for mobile devices, regardless of the specific operating system used.
Mobile Apps

A mobile app is an application designed for mobile devices, such as tablets and smartphones. Compared to a traditional application, a Mobile App has two main differences: the device on which it is used and a reduction in complexity that, through the elimination of extra elements, makes it lighter and faster.

Essentiality, the App's main feature is to omit unnecessary elements.

Numerous types of Apps are sold, for example those used for e-commerce, electronic mail, calendar, contacts, games, for listening to the radio, TV, social networks, etc.

According to a research carried out from comScore in May 2012, Mobile Apps are used much more than the web. Yet, none of the existing products has an app for Storage and SAN Administrators!

Due to the small displays (maximum 10 inches) and the reduced memory and storage capacity of mobile devices, Mobile Apps are becoming essential. They must hold only necessary features, focusing on the health system and provisioning of new LUN’s. Additionally, they should avoid long lists, for example through the use of a good layout and filter system. Finally, they should have a good monitoring system so as to avoid accidental deletion of important data.

Main operating systems for mobile devices and APP distributions

The most useful operating systems for mobile devices are:

1. Android (Google)\(^1\)
2. iOS (Apple)\(^2\)

Android is the most widespread operating system for mobile devices and it is free. Since Android development is open there are many digital distributors.

The official distributor is Google Play\(^3\), which in 2012, surpassed 25 billion of downloaded applications in less than four years\(^4\). Other distributors are Amazon App-Shop\(^5\) and AppBrain\(^6\).

iOS is the operating system for Apple’s iPhone, iPod, and iPad. The Apps official distributor in iOS environment is App Store.
State of the art

Today, most vendors provide a graphical user interface (GUI) for management of their products. However, these computer programs are very complex, often slow, and using them is difficult, particularly if the PC has a reduced computing capacity.

Some examples are:

<table>
<thead>
<tr>
<th>Vendor</th>
<th>Application</th>
<th>Storage Array</th>
</tr>
</thead>
<tbody>
<tr>
<td>EMC</td>
<td>Unisphere</td>
<td>CLARiiON, VNX, Celerra Series</td>
</tr>
<tr>
<td>EMC</td>
<td>SMC</td>
<td>Symmetrix/VMAX Series</td>
</tr>
<tr>
<td>HP</td>
<td>Storagework</td>
<td>XP Series</td>
</tr>
<tr>
<td>HP</td>
<td>Inform Management Console</td>
<td>3Par Series</td>
</tr>
<tr>
<td>IBM</td>
<td>TotalStorage Productivity Center</td>
<td>DS Series</td>
</tr>
</tbody>
</table>

Figure 1: Storage Array Management GUIs examples

These products where designed to be used on PCs; therefore, they are inadequate for tablets or smartphones. Vendors developed some apps as a way to advertise their products. For example HP StorageInfo\(^{10}\) Version 1.2.8 shows overview and technical characteristics for each HP storage array image, while NetApp Support\(^{11}\) and EMC Support App\(^{12}\) were developed to provide support and NetApp Document Search\(^{13}\) to look for documentation.

However, none enable storage array monitoring and management.

Unisphere \(^{14}\) App considerations

EMC enables management of its storage arrays such as CLARiiON, VNX, and VMAX through the Unisphere application.

The layout of Unisphere web GUI for PC is shown in Figure 2.

The main menu shows five secondary menus: Dashboard, System List, Domains, Alerts, and Support. For each selected menu, a corresponding list of information is shown. Figures 2 and 3, for example, show List and Alerts.
This layout is not suitable for smartphones because of the small screen. It would be better to choose a menu such as the one shown in Figure 4a. The System List menu should show a shorter list of only essential information about the managed items (Figure 4b).

The secondary menu changes depending on the choice from the main menu. Figure 5 shows an example of a CLARiiON secondary menu in Unisphere web GUI version.
This menu cannot be used on touch screen devices because of the animations.

It should be adapted for touch screen devices as shown in Figure 6.

This is an example of a menu that is not suitable for an App because it contains too many animations and illustrations.
Figure 7: Esempio di menu non essenziale
Function to create a logical device

The functions used to create logical devices produces a pop up by clicking on the right button of the mouse. This choice is not possible with touch screen Apps since they do not have a mouse.

![RAID Groups Table](image)

![Create LUN Function in Unisphere GUI](image)

Figure 8: Create LUN function in Unisphere GUI

In this case, choices should be cascaded.

For example: Create LUN > choose RAID Group > fill in LUN parameters and apply.

LUN masking and unmasking

The pull-down method is not adequate for LUN masking on mobile devices. However, it is possible to add filters for the different choices so that long lists can be avoided. An app enables adding or cancelling a LUN to/from the storage group with a tap of a finger though this could be quite risky. Therefore, it is important to introduce adequate alerts.
Figure 9: LUN Masking with Unisphere GUI

<table>
<thead>
<tr>
<th>Name</th>
<th>ID</th>
<th>Capacity</th>
<th>Drive Type</th>
<th>Host ID</th>
</tr>
</thead>
<tbody>
<tr>
<td>LUN 400</td>
<td>400</td>
<td>300,000 GB</td>
<td>FC</td>
<td>0</td>
</tr>
<tr>
<td>LUN 401</td>
<td>401</td>
<td>300,000 GB</td>
<td>FC</td>
<td>1</td>
</tr>
<tr>
<td>LUN 402</td>
<td>402</td>
<td>300,000 GB</td>
<td>FC</td>
<td>2</td>
</tr>
<tr>
<td>LUN 403</td>
<td>403</td>
<td>300,000 GB</td>
<td>FC</td>
<td>3</td>
</tr>
<tr>
<td>LUN 404</td>
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<td>FC</td>
<td>4</td>
</tr>
<tr>
<td>LUN 405</td>
<td>405</td>
<td>300,000 GB</td>
<td>FC</td>
<td>5</td>
</tr>
<tr>
<td>LUN 406</td>
<td>406</td>
<td>300,000 GB</td>
<td>FC</td>
<td>6</td>
</tr>
</tbody>
</table>

Warning: HLU numbers higher than 255 may result in application outages if not supported by the host failover software.
References

1 http://www.android.com/
2 http://www.apple.com/it/ios/
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7 http://www.emc.com
8 http://www.hp.com
9 http://www.ibm.com
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12 http://www.emc.com/apps/support-mobile.htm
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Biography

Vincenzo Orlando is a SAN and Storage Administrator for a large IT company in Naples, Italy. He holds a bachelor’s degree in Computer Science achieved at Federico II University, in Naples. He has experience with EMC, HP, IBM, and HDS storage as well as Brocade and McData FC switches and directors environments. He is a certified EMC Proven Professional Storage Administrator Symmetrix Solutions Specialist.

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