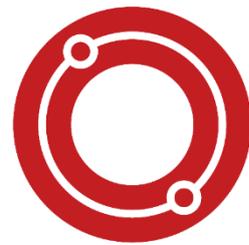


**ODDUU ALL-IN-ONE
CLASSIC PC AND
VIRTUAL DESKTOP
INFRASTRUCTURE
(VDI) PROPOSAL**



ODDUU

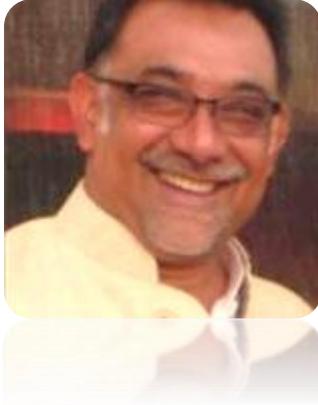
ODDUU Limited

Overcoming Digital Divide for You and You

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Dhaka – 1213, Bangladesh

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MESSAGE FROM THE MANAGING DIRECTOR



At ODDUU Limited, our mission is to provide our customers with the next generation of productivity tools through innovation using our deep knowledge of the changing global consumer and technology.

ODDUU Limited develops software, hardware, IT enabled services and training services. ODDUU Limited provides DaaS (Desktop as a Service) solution (both hardware and software), and Internet of Things (IoT) Design and Software solution for Bangladesh and the international market. ODDUU Limited's IoT, DaaS, Virtual Reality, Drone technology solution has global market reach.

ODDUU Limited has a well-deserved reputation for quality customer service and easily adapts to the changes in demand in the market by taking full advantage of improvements in technology to provide the most cutting edge products for the market. To date ODDUU Limited has the largest Virtual Desktop Infrastructure deployment in Bangladesh at the American International University - Bangladesh.

Most importantly, we provide the implementation and support for this new solution that ensures your staff can ramp up quickly and realize concrete improvements in productivity and management.

A handwritten signature in black ink, appearing to read 'Jasim Ahmed'. The signature is fluid and cursive, written in a professional style.

Jasim Ahmed
Managing Director
ODDUU Limited

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PROPOSAL FOR ODDUU VDI

For Your Organization

OVERVIEW

ODDUU Limited is pleased to submit this proposal for its ODDUU VDI product and services to your organization in achieving its goals to increase the knowledge and practical experience on IT and computing by providing an alternative inexpensive computer system that will help to efficiently and effectively train individuals while simultaneously increasing the productivity and management at a work environment. ODDUU Limited will also provide training and post-sales support for its ODDUU VDI system to further assist your organization to accomplish its goals and objectives. ODDUU Limited is committed to improving the customer experience through convenience, accuracy of orders, and timely delivery. This document also provides an overview of the technical specifications of the product along with guidelines on the vast array of applicable solutions for modern day computing.

PRODUCT INFORMATION

ODDUU Limited's Virtual Desktop Infrastructure (VDI) product is based on a platform independent architecture that enables users to run Windows 7, Windows 10, and Linux desktop environments using cloud technology in a way that enables a person to experience a full desktop computing environment without having to purchase traditional CPU and extra peripherals. This technology will reduce the cost of owning a desktop exponentially closing the gap of "Digital Divide" in Bangladesh – it's a cost-effective way to promote the IT sector initiatives in your organization.

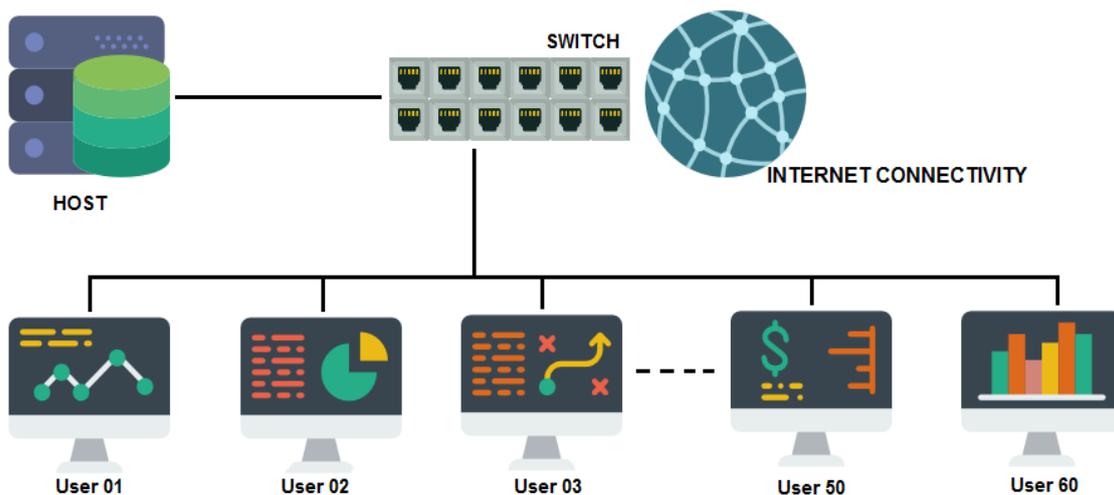


Figure: Virtual Desktop Environment

ODDUU Limited has developed solutions to help businesses and educational institutions stay ahead of the curve by implementing a VDI solution focused on your requirements helping you to overcome their

limitations and increase productivity. Our solution can easily be deployed in any business and/or educational institution exponentially cutting down the cost to build an IT infrastructure. This technology can be integrated with your existing environment or independently and is applicable for all sizes of IT infrastructures and provides a cost-effective solution to access the full functionality of a desktop at a fraction of the cost.

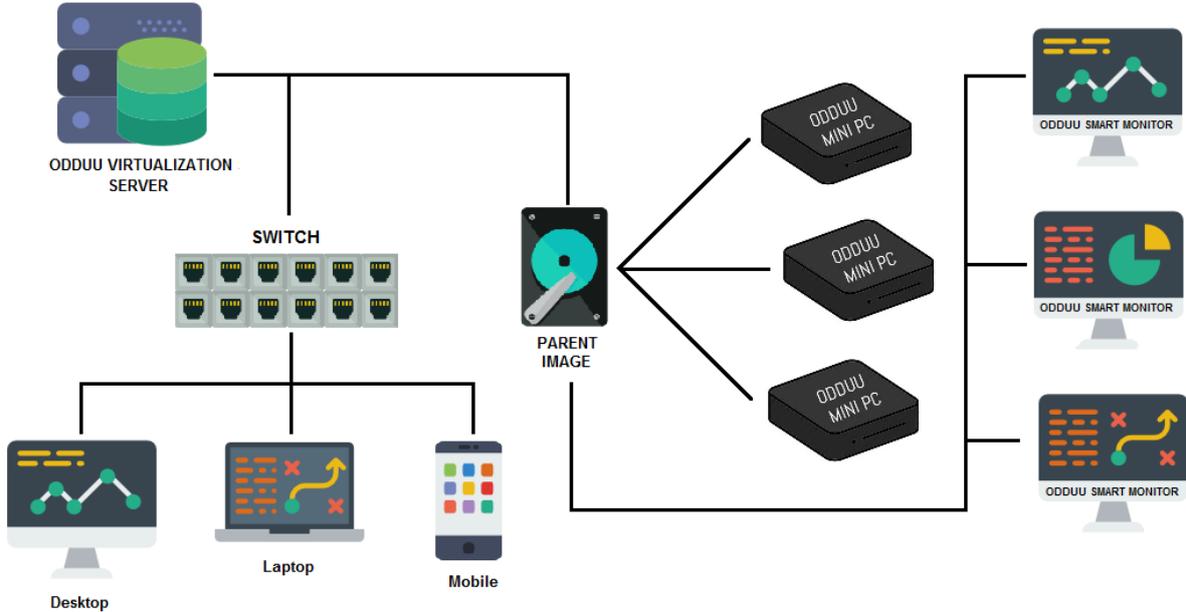


Figure: Cloud Based VDI Infrastructure

With the rise of cloud computing in the world and the advancements in IT, ODDUU provides an inexpensive solution to address the challenges and provides the solution to meet the growing needs of the world. With a wide range of prospects available, ODDUU Limited VDI will help you to fully utilize the benefits of cloud technology.

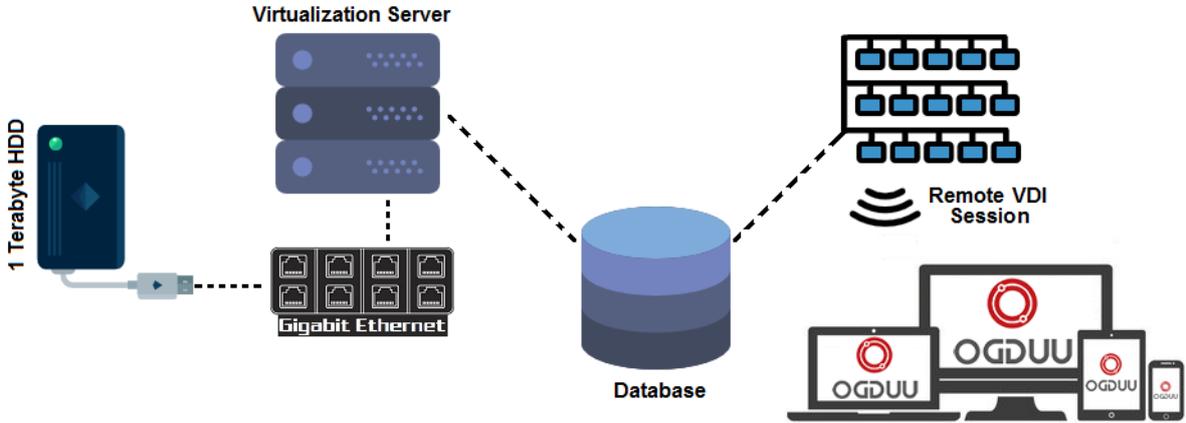


Figure: Remote VDI Capability

ODDUU Limited's Private Cloud Implementation creates a Virtual Desktop Infrastructure or VDI, in its adaptation of virtualized server technology. Using enterprise virtualization products like Citrix

XenServer, Linux KVM / VMW are hypervisor on the server to create multiple virtual machines within the server, with each virtual machine containing a user’s workload, their operating system, applications, user data and profile. The workload is seamlessly accessed using the ODDUU VDI as a standard desktop PC. By using the ODDUU VDI and Private Cloud (ODDUU Virtualization Server) enterprises of all sizes can provide Desktop as a Service (DAAS).

ODDUU VDI allows an OS like Microsoft Windows to execute in its own dedicated virtual machine on the server. In this way, multiple user’s applications will not conflict with one another. What’s more, with desktop environments consolidated within the data center, organizations can deliver secure, isolated desktops that are always on, and securely accessible from anytime with or without integration with Active Directory.

The largest Virtual Desktop Infrastructure deployment to date is at American International University-Bangladesh with 600 ODDUU VDI’s with custom Linux based operating system.



PRODUCT SPECIFICATIONS: ODDUU ALL-IN-ONE CLASSIC*			
Monitor	19-inch (900p)	USB Connectivity	x3 USB 2.0 Connector
Processor	Intel Cherry Trail x5-z8300	Audio Output	3.5mm jack
CPU	Quad Core 1.4/1.8 GHz z8300 processor	Ethernet	10/1000 Base Ethernet socket
Storage	32GB	MircoSD Card Slot	Yes
Memory	2GB DDR3L-1333 RAM	HDMI	Integrated
GPU	Intel HD Graphic, 12EU Gen8LP 500 MHz	Power Consumption	5W
Wi-Fi & Bluetooth	Built-in	Power Saving Mode	1W

*ODDUU All-in-One CLASSIC & PRO PC can be purchased separately or with the VDI Solution.

ODDUU AIO CLASSIC PACKAGE CONTENTS

The following materials are supplied in the box by ODDUU Limited for this project:

MATERIALS SUPPLIED IN EACH INDIVIDUAL PACKAGING
ODDUU All-In-One Classic PC
Power Supply Cable
User Manual
Warranty Information

CENTRALIZED MANAGEMENT

ODDUU Virtualization Server

ODDUU Limited has designed the ODDUU Virtualization Server (OVS) with a management dashboard. The Dashboard centralizes all aspects of the private cloud infrastructure and allow the administrator to monitor and configure different network components including the OVS, the VM's hosted on the OVS, the clients etc.

The management dashboard that is built for the OVS provides a rich user interface that allows an administrator to manage the ODDUU Clients deployed along with their virtual infrastructure from a web browser from any device. The ODDUU VDI Client is an End Point Device that ODDUU Limited has designed and built as zero clients VDI. The OVS dashboard allowing even the most advanced configurations such as creating and disconnecting Virtual Machine (VM) and ODDUU Clients from this centrally managed graphical user interface (GUI).

Basic System Architecture

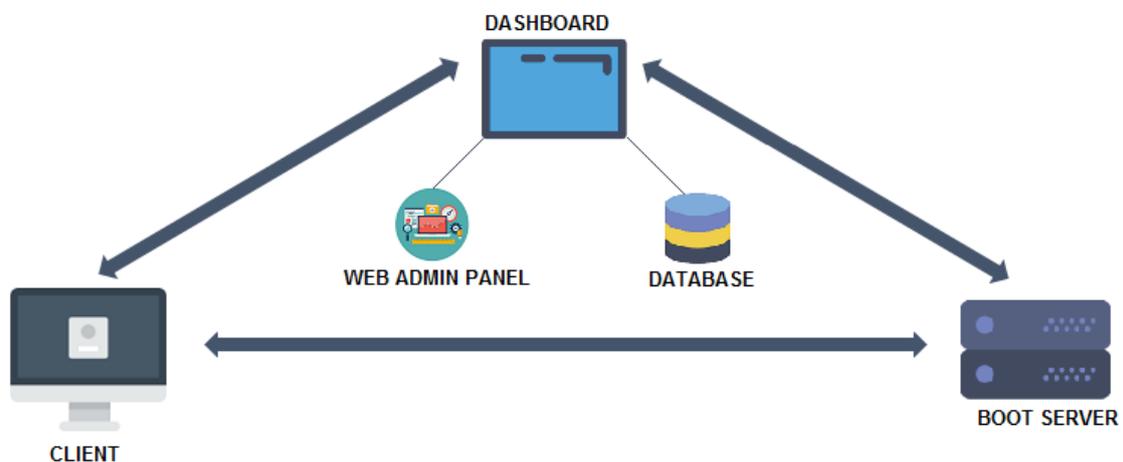


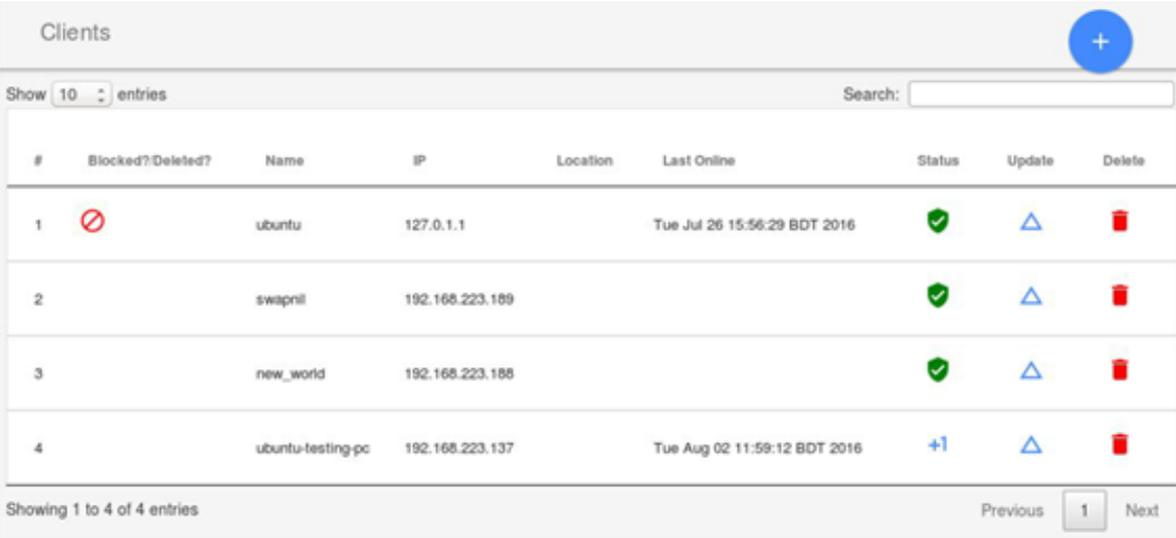
Figure: System architecture for client/ODDUU management

STANDARD FEATURES

Inventory of clients

The dashboard has an inventory of clients deployed in the network. It shall maintain a database table, named client, in the background as an inventory of all the clients installed in the network. On the front end, it will display the client table entries as a searchable list, accessible through the main menu under Clients tab.

The dashboard also provides controls to support making entry to the table client, displaying details specific to a particular row, updating a client's properties, or deleting a row.



#	Blocked?/Deleted?	Name	IP	Location	Last Online	Status	Update	Delete
1		ubuntu	127.0.1.1		Tue Jul 26 15:56:29 BDT 2016			
2		swapnil	192.168.223.189					
3		new_world	192.168.223.188					
4		ubuntu-testing-pc	192.168.223.137		Tue Aug 02 11:59:12 BDT 2016	+1		

Figure: Searchable list of clients

There are two standard ways to compile the list of clients:

1. By configuring the clients to communicate with the dashboard, by specifying server IP and port.
2. By manually inputting data through the dashboard. Entering multiple clients at a time shall be supported by importing data from a CSV file. A single client entry shall be done using a form.

Use cases:

- Since a blocked client cannot be used to connect to a VM, temporary block on a client is used as a maintenance feature. The system admins could block clients during a maintenance window and deploy patches, updates to the client. After the maintenance work is completed, the system admins can unblock the client again, so that it may be used to connect to a VM. To incorporate this use case VM allocation has to be implemented through the dashboard.
- A unique client is identified through its MAC address. Relocating a client will automatically update the IP address in the inventory upon next established communication between client and dashboard.

Pre-configuration for Mass Client Installation

The dashboard provides an interface to remotely generate the pre-seed file(s) on the boot server. A client side OS installation of archlinux is a two-step process. On the boot server, a tar.gz file is created based on entry of client hostname (derived from CL number and/or PC number), client IP, and corresponding VM IPs. Then a bootable USB Drive with the .iso is used on the client side, the tar.gz file is then pulled from the boot server and the installation process automatically completes itself. This feature automates the first step and provides a remote interface to the boot server through dashboard GUI. Given an IP range, CL number and PC range, this control shall automatically generate the pre-seed tar.gz file for all clients in that range. This will save time required for the pre-configuration step of mass installation and allow sys administrators to remotely issue command to the boot server.

Configuration of individual client(s)

The dashboard provides an interface to remotely generate or replace the configuration files of client(s). From the client side GUI, a system admin can configure the VM(s) it will connect to, the client's IP and hostname, or parameters like dashboard IP, enable OS selection, organization name, organization logo etc. This feature proposes that the same changes to a client can be done remotely through the dashboard. The dashboard also provides an interface to select one or more clients and deploy a new jar file to selected client(s).

Client State Monitoring

The dashboard displays the activity state of deployed in the clients list. A client has 3 states a) powered off/shut down(SHUTDOWN), b) running with no active

connection (RUNNING), and c) actively running with a connection to a VM (CONNECTED). This feature displays the current state of all clients in a new column in the clients list. The dashboard will ping each client on the list based on a polling interval and subsequently determine whether it is powered off or up and running.

Client(s) Administration

The dashboard provides controls to remotely administer client(s). The system admin can shut down or reboot multiple client PCs straight from the dashboard.

Client Health Check

The dashboard provides controls to remotely perform health check of a client. The system administrator can remotely check the health status of the machine i.e. find out it's CPU usage, memory usage, disk I/O, disk space etc. from the dashboard.

Alarm generation

The dashboard generates alarm for unexpected client behaviour based on high resource usage by client or abrupt state change. This feature proactively identifies clients that are consuming too much resource (RAM/CPU) or behaving abnormally (abrupt shutdown without admin issued command) and highlights

them in the dashboard so that the system administrator can take appropriate action even before the users contact them.

Dash Board Panel:

The dashboard is the front page of the Administration UI.

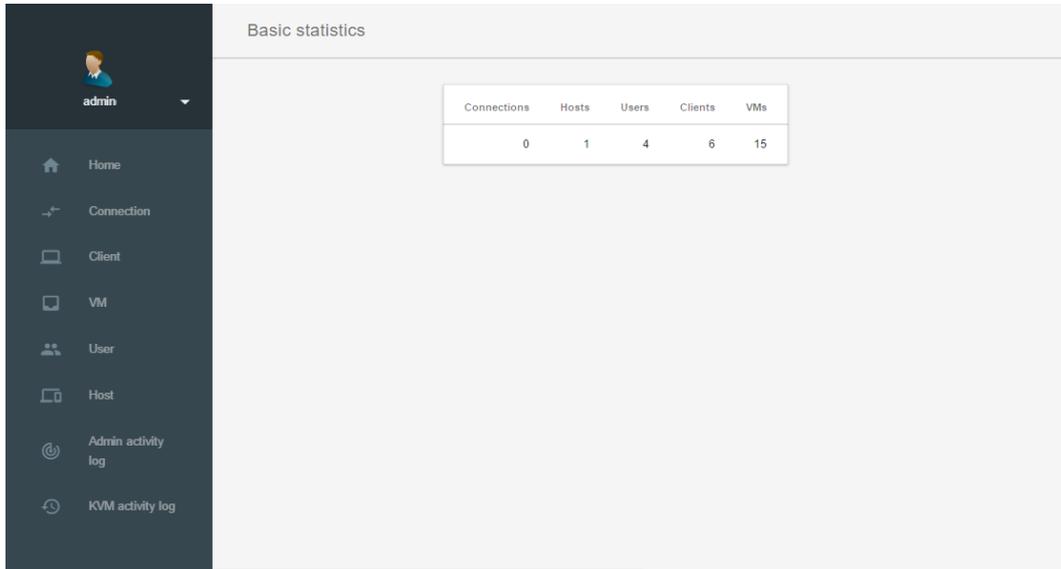


Figure: Dashboard Panel

Monitoring Active Users:

Ability to monitor currently active connections and force disconnect a user or shut down VM.

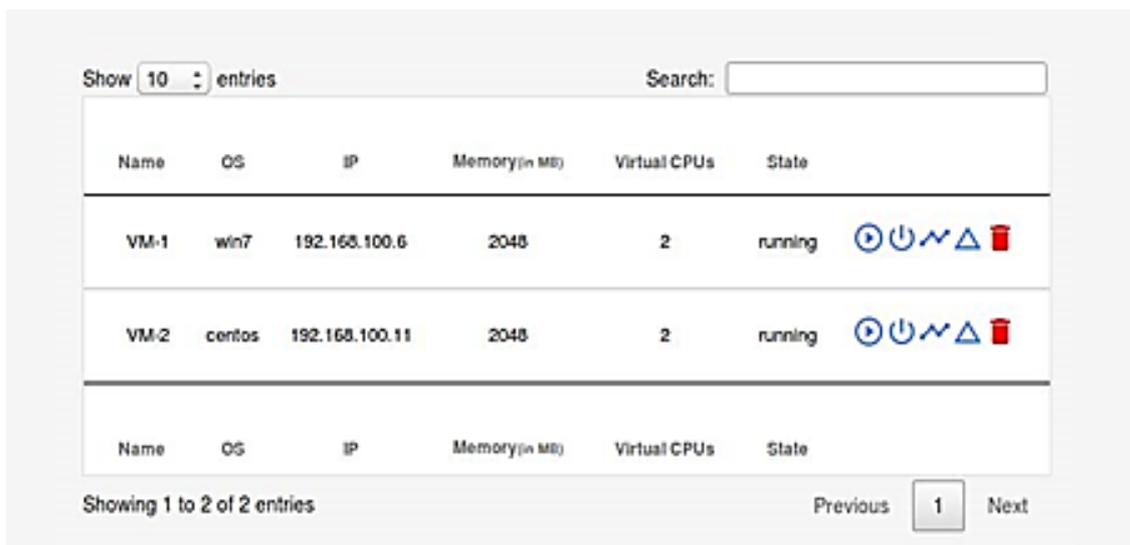


Figure: Monitoring Active Users

VM Configuration and Maintenance:

Ability to run, shut down or monitor CPU and memory usage of a specific VM or reconfigure CPU, memory, or disk space assignment.

Name	OS	IP	Memory(In MB)	Virtual CPUs	State	
CentOS-ODDUU	Undefined	192.168.223.11	8192	2	shut off	
Centos7	centos7_0	192.168.100.5	8192	4	shut off	
Win7test_1	win7	192.168.223.101	2048	2	shut off	

Figure: VM Management

The Main Advantages

1. Centralized Management

- One-to-many management of desktop images is linked to standardized templates.
- Centralization simplifies management in keeping with managed diversity.
- Infrastructure is logically segmented in the datacentre and managed separately, which enables seamless transition of users in the insurance organization.

2. Flexibility

- Users can connect to the same desktop environment from any network-connected client, which enables "Change the Way We Work" initiatives.
- Embedded CPU in the monitor enabling a more spacious work environment.
- Each user environment is centrally managed and can be placed anywhere on the network.

3. Security

- All data remains within the datacentre and can be backed up.
- All datacentre access is authenticated and audited.
- A virtual desktop kept inside the data centre will secure information. This gives you more control over IP; you only need to lockdown the image you create so that it cannot access external devices.
- The ODDUU VDI provides improved security on the PC paradigm by centralizing management, data and sometimes execution to enforce security initiatives.

- The ODDUU VDI is more secure, available, reliable, manageable, scalable, and offers a better ROI and lower TCO than PCs.

4. Power Reduction

- VDI results in a reduction in overall workplace-related carbon emissions.
- Significant reduction in power usage which results in a decrease in electricity bills

5. Cost Effective

- Low cost computer system which significantly decreases operational costs and has a significant effect on the cost of each desktop, sometimes reducing it by as much as 40%.
- VDI transforms the desktop lifecycle and reduces its number of components.
- The Private cloud allows the VDI to work with a single OS and application license, whereby license costs are reduced significantly within the private cloud infrastructure. A single genuine licensed version of any software can be used for all VM's instead of needing to buy them separately for each PC.
- Reduces costs by simplifying management, deployment, and increasing reliability while also increasing agility and life cycle.

6. Disaster Recovery and Business Continuity

- In the event of office locations becoming unavailable, VDI allows users to work from remote locations.
- Centrally managed desktops provided to users on any endpoint device -- desktops, thin clients & Web clients, these end points can be used as Windows OS, Linux OS or iOS as needed in given time.

7. Faster troubleshooting

- VDI reduces the tedious task of running out to physical PCs as images can be accessed from any linked workstation, any user facing hardware trouble on their usual systems can go to another one and access their data and applications simply by logging in and having their policy based apps and rules pushed to them.

8. Single OS utilization and management

- Each user utilizes the same image i.e. the operating system as well as the installed applications which reduces administrative and support costs. Updating VM's is simple and fast as well as - Install applications, patches, and drivers once, and every user relying on that image benefits from the update.

9. Hardware virtualization

- All the VMs over the virtualized infrastructure use a base image of the hardware for processing different requests and managing different drivers. This saves the extra cost of establishing each unit of hardware for each workstation; instead all the workstations can be accommodated with a centralized hardware.

10. Increased Productivity

- Productivity can increase by more than 98%, while standard PCs have long repair times that cause delays and higher costs as multiple systems can be virtually preconfigured, packaged and put into operation in minutes.
- Each virtual machine works as an individual machine on the same server, so even if one of the VM crashes throughout the operations it does not affect the working of other VMs.

OVS Features Summary

FEATURE	DESCRIPTION
Centralized Management	Manage all aspects of OC, VM Guest configuration including network configuration, bonding, CPU allocations and storage. Supports Open Source KVM Virtualization Hypervisor hosts.
Monitoring	Real time monitoring of OC profiles, VM CPU utilization and storage. Alerts and notifications.
Security	OC based access control allowing defined granted access for a VM and Operating System. Detailed audit trails integrated with Database and Institutional Active Directory.
Maintenance Manager	Perform maintenance on guests and OC without downtime. Upgrade OC directly from management system.
Live Migration	Dynamically move virtual machines between hosts with no service interruption.
High Availability	Virtual machines automatically restart on another host in the case of host failure.
System Scheduler	Balance workloads in the datacenter by scheduling the virtual machines based on OC resource usage and policy.
Power Saver	During off-peak hours, concentrates VM on fewer physical hosts to reduce power consumption on unused hosts.
Image Creating	Create new virtual machines based on templates. Use snapshots to create point-in-time image of VMs.
Image Deleting	For improved utilization deleting VM based on systems resources.
Force Disconnecting	Command line management for disconnecting a VM from OC for misused.
Scalability	Manage to create, remove, disconnect and update in large private cloud infrastructure with scalable management platform including the active users on any given time.

PRODUCT DELIVERY

Execution Strategy

Our execution strategy incorporates proven methodologies, extremely qualified personnel, and a highly responsive approach to managing deliverables. The product has a 1-year warranty starting from the date of delivery.

Deployment

There are two mode of deployment offered by ODDUU Limited.

Option 1

ODDUU All-In-One Client Plus Private Cloud (Server)

This configuration with Virtual Desktop Infrastructure is best suited for a large organization with proper internet connectivity. The ODDUU All-In-One PCs can either be used as ODDUU Hosts or as a standalone PC.

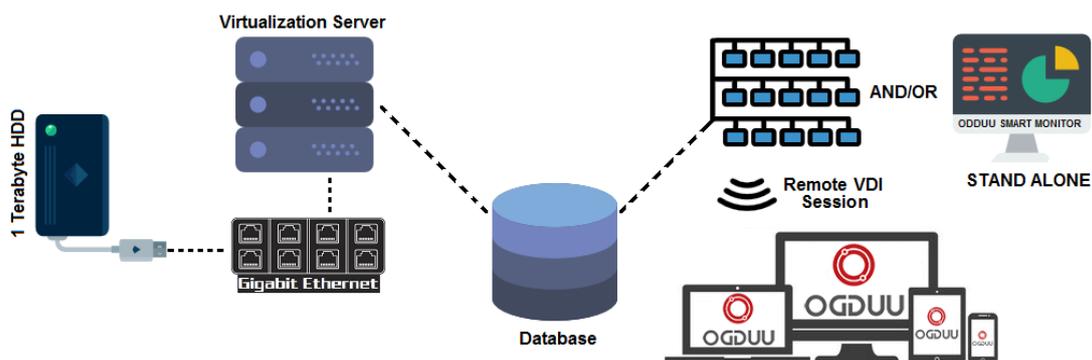


Figure: Remote VDI Capability

- Private Cloud (Server) Configuration can be used to create Virtual Machines (VM) using Citrix XenServer, each VM will contain the operating system (i.e. Windows or Linux, desire applications and user data and profile), in turn each VM will be connected to the ODDUU Client where user/student will have access to all application they need for their training.
- Citrix XenServer client interface is used to create VM Template (windows or Linux, desire applications and user data and profile)
- VM template are then replicated to create as many VM needed given the capacity of the Private Cloud (Server), typically 32 GB RAM Server can create 20 Virtual Machines, which in can be to pushed to all ODDUU Clients for desktop usage.
- Nothing is required to do on ODDUU Client side, it will just work like an End-Point Device as a standard traditional desktop.
- Any OS issues, corruptions, mal-function can be fixed within a few minutes notice from the virtual server side.
- Private Virtual server can be centrally managed hence less IT professional involvement is needed.

Option 2

ODDUU All-In-One Client Plus ODDUU File and Wi-Fi Server

This architecture is best suited for rural environments where internet connectivity can only be done via 3G infrastructure (for example, internet dongles provided by GrameenPhone, Teletalk and others.)

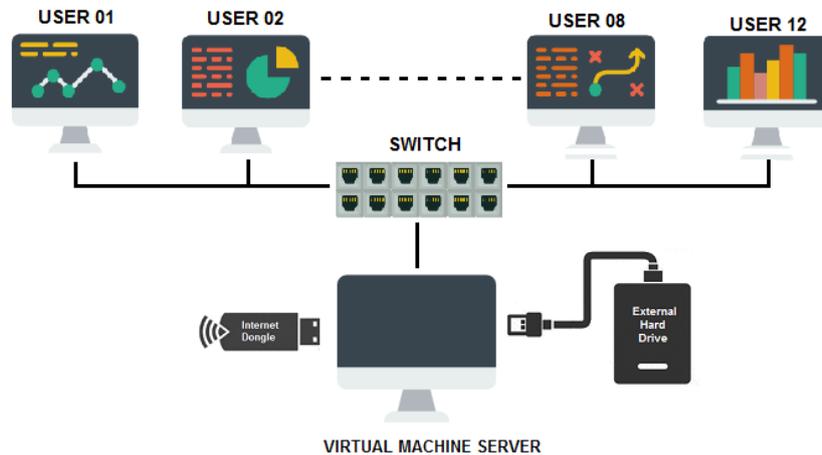


Figure: ODDUU AIO Client + ODDUU File and Wi-Fi Server

- ODDUU Clients are installed with preferred OS (Windows or Linux)
- One ODDUU Server will be used as File / Wi-Fi server
- A 10-Port switch to create a local LAN environment
- A 3G dongle for the internet access
- A 500 GB external drive for user's data storage.
- Any necessary programs required by your organization

CONCLUSION

We look forward to working with your organization and supporting your efforts to improve your organization. We are confident that we can meet the challenges ahead, and stand ready to partner with you in delivering an effective solution.

If you have questions regarding this proposal, feel free to contact us at your convenience by email at info@odduu.com or by phone at +880-1995-390-787.

Thank you for your consideration,



Jasim Ahmed
Managing Director