

Modernizing z/VM with zPRO, On prem cloud on IBM Z

www.VelocitySoftware.com

www.LinuxVM.com

Barton Robinson, CTO, Velocity Software

- **Who is Velocity Software**
- **Why zPRO**
- **zVWS – the z/VM Native Web Server**
 - Fast, powerful, modernizing, required in this century
- **Simplify your environment with on prem cloud**
 - zPRO – On-prem Private Cloud

Who is Velocity Software

Founded 1988,

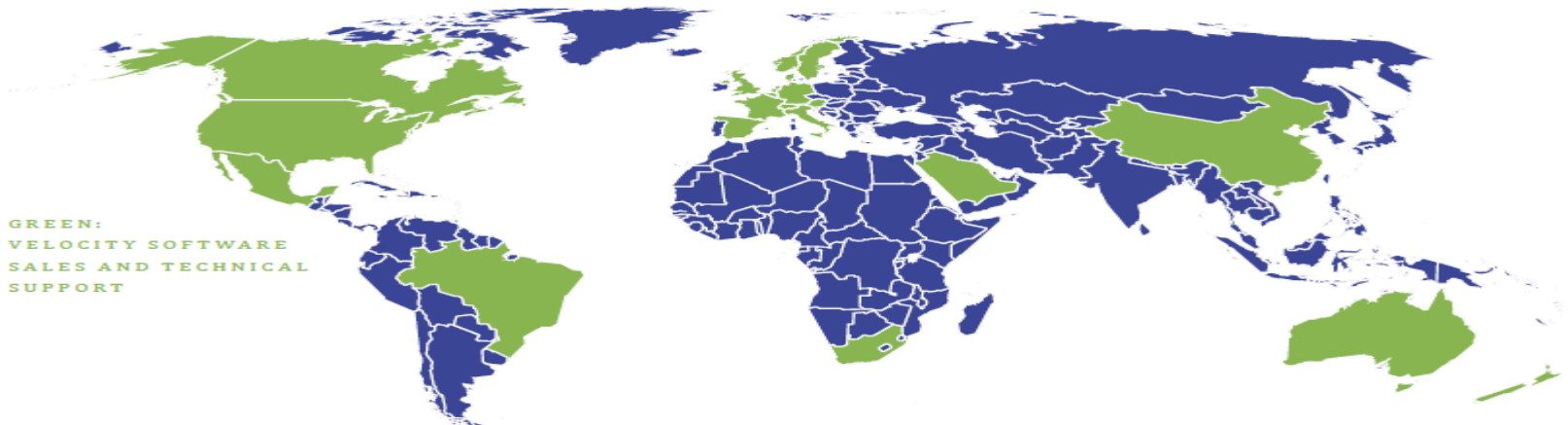
Mission: **Provide software to assist customers in optimizing the VM platform:**

Continuous fully integrated enhancements over 30 years

200+ Installations (zVPS) (**more than z/VM ½ IFLs world wide**)

22 countries, 6 continents

Velocity Software's Sales and Technical Support Map



GREEN:
VELOCITY SOFTWARE
SALES AND TECHNICAL
SUPPORT

Industries using Linux and Velocity Software

Banking, Financial:

Government / Military:

Health Care, Insurance, Retail

**Manufacturing: Automotive, computing, Oil
Outsourcing**

Velocity Software product set

zVPS: Performance Management Suite, includes:

- zVIEW: Web based Graphical Performance Displays
- zMON: Real-time Monitor
- zMAP: Historical Reports
- zTCP: Network Performance Data Collection
- zVWS: High Speed Native Web Server for z/VM
- zOPERATOR: Full Operator Console
- zALERT: Full Operations Alert Support
- zPORTAL: Web application to manage certain zVPS functions

zTUNE: Rules Based Analysis and Performance Services

zOSMON: z/OS Performance Monitoring

VSEMON: z/VSE Performance Monitoring

zPRO: Cloud Enablement for z/VM and Linux on IBM Z

Why zPRO?

Customers want simple

- Few z/VM Skills
- Little Time

Customers want on Prem Cloud

- Reduces Skills requirements
- Reduces Time requirements for server build / management

I want it now....

- zVPS installs in 2 hours for 1st LPAR
- zPRO Installs in 10 minutes on top of zVPS
- zPRO Tailors in 2 hours
- Usable by everybody concurrently that is authorized
- Clones servers in seconds (assuming flash copy)

zVWS – The Velocity Software Webserver

Modern means “internet”

zVWS Developed (1998) for native z/VM web pages

- VelocitySoftware.COM
- Linuxvm.ORG
- Other user groups

Developed to be very very fast

- VelocitySoftware.com hosted on z/VM on p390 (18Mhz)
- **Written in assembler – running on z, fastest server possible**
- Built in security is important too

Many customers have built zVWS applications

- Used by DOD for secure client certificate
- Used by banks for financial applications
- Used by government agencies for serving critical applications
- State government uses zVWS to server state legislature
 - **(if zVWS goes down, state government goes down)**

zVWS – The Velocity Software Webserver

zVWS is **very simple** – secure, reliable, and elegant

- Web servers single threaded to **maintain reliability**
- VERY small foot print per server (32mb) – compare to http process....
- 5 servers (160mb) sufficient for most applications
- Security via SSL, now using IBM SSL/TLS (HTTPS)

What can be served?

- All forms of HTML, PDFs, CGI
- CSL, Java script, JAVA (no server side java, no “dot net”)

What CGIs can be developed?

- Anything that runs in CMS (EXEC, REXX, Assembler, PL/1....)

zVWS is very powerful, very simple modernizing engine

- General purpose
- Flexible

zVWS – Samples

zVWS is z/VM native generalized webserver

- Multi-application
- Full access to CP, CMS, z/VM Applications!
- zVIEW, zOPERATOR, zALERT, zPORTAL, zPRO.....

Easy samples

- Issue any browser issued CP command in 25 lines of code
<http://192.168.5.43/cpform.html>
- Interface to DIRMAINT to look at directory entries
<http://192.168.5.43/dirmform.html>
- Interface to view a file on a browser
<http://192.168.5.43/view?fn=showdirm&ft=CGI>

zVWS – Customers want simple

CPFORM HTML

```
<html><head>
<title>Issue a CP command</title>
</head><body>
<form action="showcp.cgi"
  method="post" enctype="multipart/form-data">
<p>Enter a CP command then hit ENTER</p>
<input type="text" name="cpcommand"
  placeholder="CP command" />
<p>
<input type="submit" name="b1" value="Issue Command" />
</form></body></html>
```

Enter a CP command then hit ENTER

SHOWCP CGI

```
/* How much easier can it be? */
cpcommand = ''
'GETARGS'
'OUTPUT <html><body><pre>'
If cpcommand = '' Then
  'OUTPUT You must enter a command'
Else
  Address 'COMMAND' 'PIPE (endchar ? Name
    SHOWCP:1)',
    '| VAR CPCOMMAND',
    '| XLATE',
    '| CP',
    '| OUTPUT'
'OUTPUT </pre></body></html>'
```

```
z/VM Version 7 Release 1.0, service level 1902 (64-bit)
Generated at 11/20/19 10:51:20 PST
IPL at 12/08/19 04:22:46 PST
```

zVWS – Customers want simple SHOWDIRM CGI

dirmform.html

```
<html><head>
<title>Issue a DirMaint Command</title>
</head><body>
<form action="showdirm.cgi"
  method="post" enctype="multipart/form-data">
<p>Choose a DirMaint Command</p>
<p><input type="submit" name="b1" value="TERM ?" />
  <input type="submit" name="b1" value="DATEFORMAT ?" />
  <input type="submit" name="b1" value="DEFAULTS ?" />
  <input type="submit" name="b1" value="IPL ?" />
  <input type="submit" name="b1" value="SCREEN ?" />
</form></body></html>
```

Choose a DirMaint Command

```
DVHXMT1191I Your IPL request has been sent for processing to DIRMAINT at
DVHXMT1191I VSIVM3.
DVHREQ2288I Your IPL request for ZWEB05 at * has been accepted.
DVHIPL3274I The current IPL setting for ZWEB05 is CMS with PARMS of
DVHIPL3274I FILEPOOL VMSYSVPS:
DVHREQ2289I Your IPL request for ZWEB05 at * has completed; with RC = 0
```

```
/* How much easier can it be? */
Parse Value '' With b1 b2 b3 b4
'GETARGS'
'OUTPUT <html><body><pre>'
If b1 = ''
Then 'OUTPUT You must choose a command'
Else Do
  Call Diag 8,'SET MSG IUCV'
  Call Diag 8,'SET VMCONIO IUCV'
  Address 'COMMAND' 'PIPE (NAME QPRT02 ENDCHAR ~)',
    '| STARMMSG *MSG EXEC DIRMAINT' b1,
    '| SPECS 17-* 1',
    '| PICK 1.1 == /D/',
    '| OUTPUT',
    '| ALL / RC/ ! /complete;',
    '| C: FANINANY',
    '| SPECS /PIPMOD STOP',
    '| SUBCOM CMS',
    '~ LITERAL +00:02',
    '| DELAY',
    '| C:'
  Call Diag 8,'SET MSG ON'
End
'OUTPUT </pre></body></html>'
```

zVWS – View a file

VIEW CGI

```
/**/  
Parse Value '' With fn ft  
'GETARGS'  
'OUTPUT <html><body><pre>'  
If fn ft = '' Then  
  'OUTPUT You must send the file to view'  
Else  
  Address 'COMMAND' 'PIPE (endchar ? name SHOWCP:1)',  
    '| FILEFAST' fn ft 'VMSYSVPS:ZVWS.ROOT',  
    '| CHANGE /</ /&lt;/',  
    '| CHANGE />/ /&gt;/',  
    '| OUTPUT'  
'OUTPUT </pre></body></html>'
```

<http://192.168.5.43/view?fn=showcp&ft=CGI>

```
/* How much easier can it be? */  
cpcommand = ''  
'GETARGS' 'OUTPUT <html><body><pre>'  
If cpcommand = ''  
Then 'OUTPUT You must enter a command'  
Else Address 'COMMAND'  
  'PIPE (endchar ? name SHOWCP:1)',  
  '| VAR CPCOMMAND',  
  '| XLATE',  
  '| CP',  
  '| OUTPUT'  
'OUTPUT </pre></body></html>'
```

zVWS – Simple Summary

Native z/VM WebServer

- CP/CMS Commands
- Dirmaint commands
- RACF commands

Velocity Applications

- VelocitySoftware.com (corporate website)
- zVIEW (z/VM, Linux, z/VSE, z/OS, distributed)
- zPortal
- zPRO

zVPS Enterprise View – All LPARs in Enterprise

Tailorable, expandable, zoomable

Today is Monday 2 Dec 2013 zVIEW Version 4159

VELOCITY SOFTWARE **zVIEW**
Enterprise View - Velocity Software - VSIVM4 (DEMO)

First level

VSIVM1	Expand	VSIVM2	Expand	VSIVM3(Old)	Expand																																																																															
<table border="1"> <thead> <tr> <th>VM1</th> <th>13/12/02</th> <th>18:29</th> <th>CP Total (2)</th> <th>6.63%</th> </tr> </thead> <tbody> <tr> <td colspan="5">Linux Nodes (Distributed Servers)</td> </tr> <tr> <td>LINUX9 (9)</td> <td>3.93%</td> <td></td> <td></td> <td></td> </tr> <tr> <td>suselnx3 (9)</td> <td>2.57%</td> <td></td> <td></td> <td></td> </tr> <tr> <td>REDHAT (2)</td> <td>2.30%</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	VM1	13/12/02	18:29	CP Total (2)	6.63%	Linux Nodes (Distributed Servers)					LINUX9 (9)	3.93%				suselnx3 (9)	2.57%				REDHAT (2)	2.30%					<table border="1"> <thead> <tr> <th>VM2</th> <th>13/12/02</th> <th>18:29</th> <th>IFL Total (1)</th> <th>0.91%</th> </tr> </thead> <tbody> <tr> <td colspan="5">Linux Nodes (z/VM-Guests)</td> </tr> <tr> <td>RH5X161</td> <td>0.43%</td> <td></td> <td></td> <td></td> </tr> <tr> <td>RH5Z161</td> <td>0.37%</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	VM2	13/12/02	18:29	IFL Total (1)	0.91%	Linux Nodes (z/VM-Guests)					RH5X161	0.43%				RH5Z161	0.37%					<table border="1"> <thead> <tr> <th>VM3</th> <th>13/12/02</th> <th>21:29</th> <th>024B42-0</th> <th>99.22%</th> </tr> </thead> <tbody> <tr> <td colspan="5">Linux Nodes (z/VM-Guests)</td> </tr> <tr> <td></td> <td></td> <td></td> <td>000000-64</td> <td>99.22%</td> </tr> <tr> <td colspan="5">Linux Nodes (Distributed Servers)</td> </tr> <tr> <td>LES11T</td> <td>2.29%</td> <td></td> <td></td> <td></td> </tr> <tr> <td colspan="5">Linux Nodes (Distributed Servers)</td> </tr> <tr> <td>PENSUSE</td> <td>7.68%</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	VM3	13/12/02	21:29	024B42-0	99.22%	Linux Nodes (z/VM-Guests)								000000-64	99.22%	Linux Nodes (Distributed Servers)					LES11T	2.29%				Linux Nodes (Distributed Servers)					PENSUSE	7.68%			
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Demo System V4

Demo	13/12/02	18:29	IFL Total (1)	17.77%
Linux Nodes (z/VM-Guests)				
roblx1	2.83%			
redhat6	1.18%			
oracle	0.82%			
redhat56	0.47%			
redhat5x	0.43%			
lxsugar (2)	0.41%			
redhat64	0.31%			
sles8 (2)	0.31%			
sles10	0.29%			
redhat5	0.27%			
redhat3	0.25%			
redhat6x	0.24%			
suselnx2	0.22%			
sles11 (2)	0.22%			
sles11x	0.20%			
sles11x3	0.19%			
sles9x	0.18%			
scsil0s	0.17%			
sles10x4	0.17%			
sles9	0.16%			
Linux Nodes (Distributed Servers)				
linux93 (2)	100.00%			
opensuse (2)	8.97%			
JIRA (2)	5.88%			
vpnbrz	5.50%			
vpnbrc	4.76%			
mail (9)	3.42%			
vpnz	2.35%			

Close

Second level

Tims Test System	Expand																														
<table border="1"> <thead> <tr> <th>Tim12</th> <th>13/11/27</th> <th>13:09</th> <th>IFL Total (1)</th> <th>0.10%</th> </tr> </thead> <tbody> <tr> <td colspan="5">Linux Nodes (z/VM-Guests)</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td>1.85%</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td>1.50%</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td>0.85%</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td>0.57%</td> </tr> </tbody> </table>	Tim12	13/11/27	13:09	IFL Total (1)	0.10%	Linux Nodes (z/VM-Guests)									1.85%					1.50%					0.85%					0.57%	
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zVIEW Linux performance "portal"

Nednesday 7 Nov 2018 00:46

zVIEW Version 4310



zVIEW - Velocity Software - VSIVM4 (DEMO)
Performance Displays for zVM and Linux on System z

Menu

mylinux

ESALNXP - VSI Linux Percent Usage by Process - DEMO

Time	Node	Name	ID	PPID	GRP	Tot	sys	user	syst	usrt	valu	valu	Size	RSS	Peak	Swap	Data	Stk	EXEC
00:46:00	lxdb2001	*Totals*	0	0	0	0.6	0.1	0.1	0.1	0.3	0	0	4549	322	4557	0	1391	4.8	3.8
00:46:00	lxdb2001	init	1	1	1	0.0	0.0	0	0	0	0	0	20	2.4	0.9	2.4	0	0.2	0.1
00:46:00	lxdb2001	snmpd	2200	1	2199	0.1	0.1	0.1	0	-10	10	29.7	13.4	37.1	0	17.3	0.1	0.0	
00:46:00	lxdb2001	cron	2223	1	2223	0.1	0	0	0.0	0.0	0	20	2.6	0.9	2.7	0	0.2	0.1	
00:46:00	lxdb2001	db2fmcd	2245	1	2245	0.4	0	0	0.1	0.3	0	20	50.9	13.9	51.0	0	3.5	0.2	
00:46:00	lxdb2001	db2sysc	2833	2831	2833	0.0	0.0	0	0	0	0	20	877	91.6	877	0	262	0.1	
00:46:00	lxora12	*Totals*	0	0	0	1.2	0.3	0.9	0.0	0.0	0	0	3970	724	4197	115	1845	6.6	7.4
00:46:00	lxora12	amozxma0	1503	1	1503	0.0	0	0.0	0	0	0	20	250	10.1	314	0.9	66.3	0.1	

ESAHST2 - LINUX HOST Storage Analysis Report - DEMO

Time	Node/Group	Index	<Utilization> Size Used Full Err	Pct	Alloc Units	R/W	Boot	Storage Description
00:46:00	ZPRO	0	196K 109K 55.7 0	1K				Totals
00:46:00	VPNS	0	5376 5376 100 0	1K				Totals

ESAUCD2 - LINUX UCD Memory Analysis Report - DEMO

Time	Node/Group	<Real Storage (MB)>	<--SWAP Storage (MB)-->	Total	<Storage in Use (MB)
		Total Avail Used	Total Avail Used	MIN Avail	CMM Buffer Cache
00:46:00	ZPRO	4600 3 1433 3106 0	1075 1076 10 6 107 5 4350	0 0	353 6 1070 0

ESAUCD4 - LINUX UCD System Statistics Report - DEMO

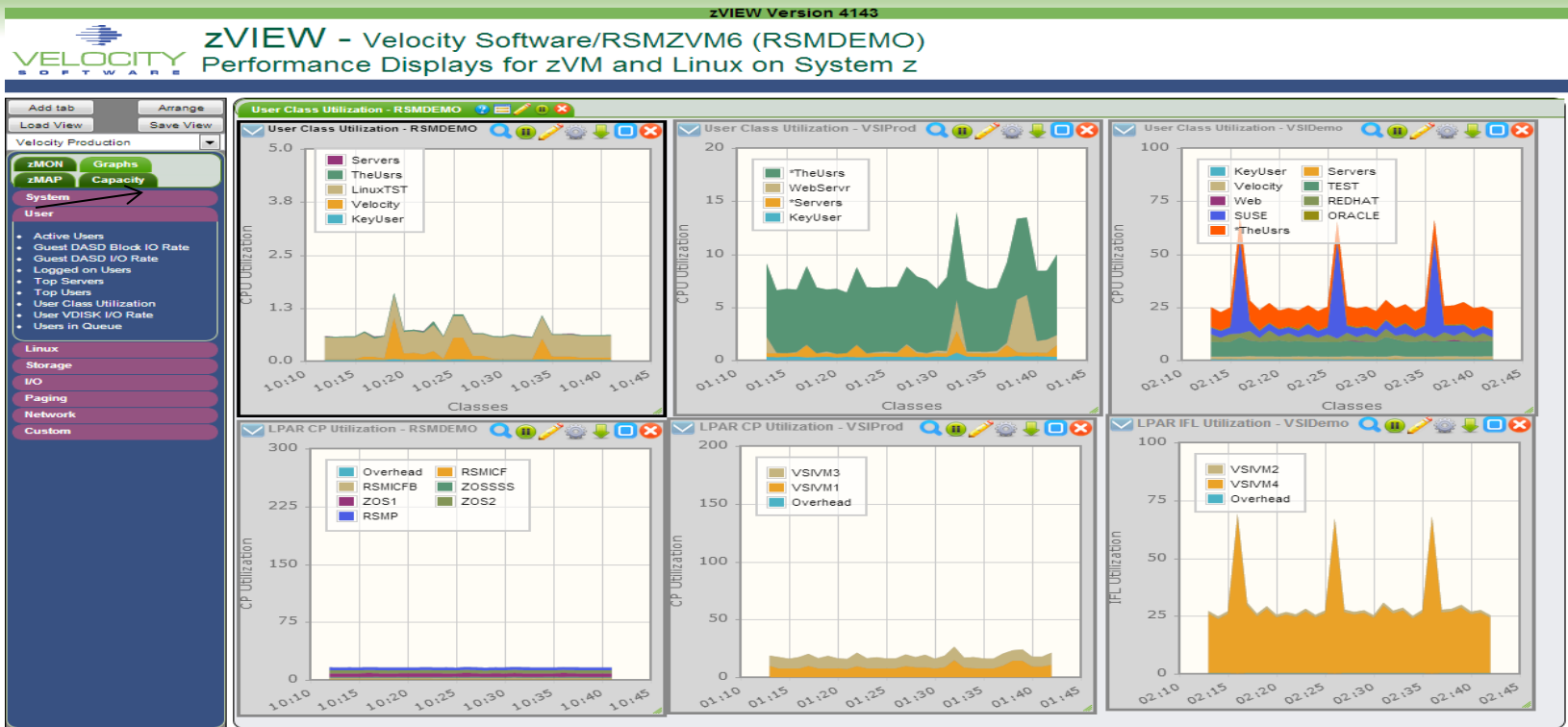
Time	Node/Group	<Processor Total Syst User Nice Pct Util>	Idle Pct	<--Swaps-->	<--Disk IO-->	Switch	Intrpt	<Load A
		In Out In Out	Rate Rate	Rate Rate	Rate Rate	Rate Rate	Rate Rate	Rate Rate
00:46:00	ZPRO	2.7 1.2 1.4 0 1188 0 0 0	56.7	2080.5	1023.7	0.49	0	
00:46:00	VPNS	10.1 4.2 5.9 0 389 0 0 0	180.5	733.9	0.33	0		

ESAHST4 - LINUX HOST System Statistics Report - DEMO

Time	Server	Num Users	<Processes>	StgSz	<--Local-->	System	<--System Initiali
		Current Max (MB)	Date	Time	Uptime	Dev	Parameter
00:46:00	ZPRO	10 10	10 10	10 10	10 10	10 10	10 10

LPAR...

Multiple System RealTime View (3 LPARs)



Data from multiple lpar's visible on "Single pane of glass"

Challenges with z/VM: “we want cloud”

- Lack of z/VM skills
- Old style interface (3270)
- Linux on hardware seems easier
- KVM seems easier (but z/VM performs and scales better)

zPRO Objectives – build on native webserver capability

- Modernize the z/VM Platform
- Simplify z/VM management
- Server life cycle management
- Provide Systems programmers with simple to use management tools
- Provide end users simple access
- RESTFUL APIs.....

z/VM Challenges (for all sites)

Directory Management

- Often bottleneck in creating/modifying servers
- Who is allowed?

Operations

- Starting / Stopping servers
- Who can do it? Server owners

Systems Management

- See available resources
- See servers / server ownership

zPRO for end users

- **z/VM Cloud Server Management**
 - Clone (provision), modify, start, stop, move, delete servers
 - Linux w/Oracle, Websphere, etc – any z/VM guest
 - Define server expirations (**life cycle management**)
 - Useful for LAB, test or proof-of-concept servers
 - Selective resource controls and quota management
 - Hierarchical control from global, to group, to user to server
 - SSI / LGR (live guest relocation) support

zPRO Server Management web page

Lpars....

The screenshot displays the zPRO Server Management web interface. At the top, there are tabs for 'DEMOSYS', 'CUSTOMER', and 'DEVELOPMENT'. The 'CUSTOMER' tab is active. On the left, a navigation menu includes options like 'Auto Arrange', 'Refresh All', 'Close All', and 'Server Management'. The main content area features three overlapping modal windows:

- Set Virtual Machine Owner:** A table with columns 'Sel', 'Virtual Machine', 'SysID', and 'Owner'. The 'DAVEL2' and 'DEMOBLK' rows are selected. Below the table are buttons for 'Assign to RKSDDEV', 'Choose Owner', and 'Unassign'.
- Add a Minidisk:** A form with fields for 'Add to Server' (set to DEMOBLK), 'Virtual Address', 'DASD Pool' (set to DEMOECKD), 'Device Type' (set to 3390), 'Cylinders / Blocks', and 'Access Mode' (set to MR). A 'Process Request' button is at the bottom.
- Change a Server's Password:** A form with fields for 'User Id' (set to DEMOBLK), 'New Password', and 'Verify password'. A 'Process Request' button is at the bottom.

End user Enterprise Functions

zPRO dialogs present a list box to select on which system to perform the function.

DEMO SYS CUSTOMER DEVELOPMENT

Clone a Virtual Machine

Target System

- ✓ Select target...
- DEMO SYS
- CUSTOMER
- DEVELOPMENT

New ID

Password

Verify Password

Account No.

No. Cpus

Memory Size

 G

Days to expiration

Auto Start Server

**Optional (blank field for no email):
Email address to send notification to**

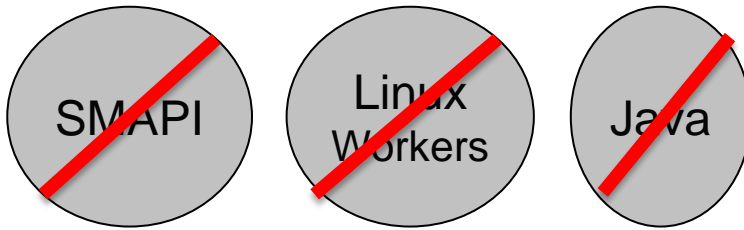
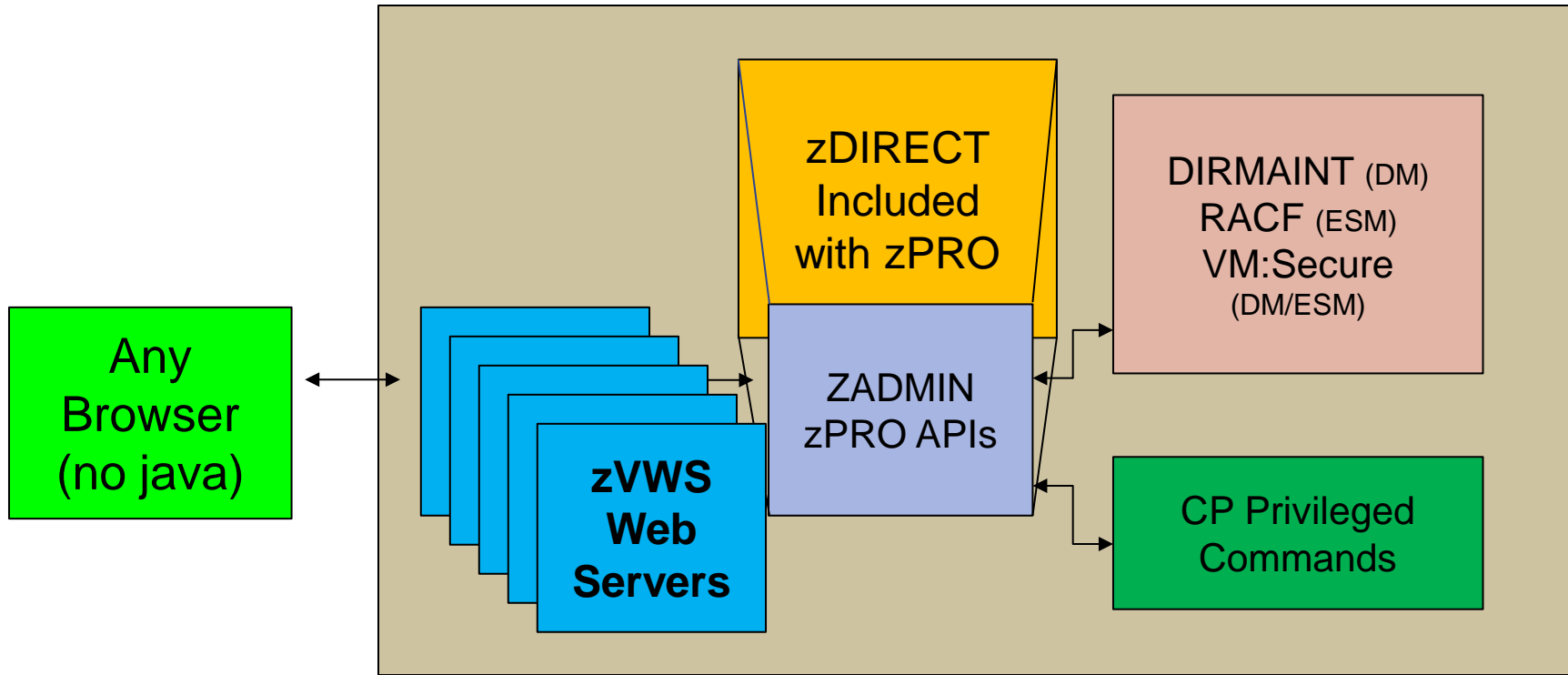
Your Return Email address

Process Request

zPRO support for platform

- **Utilizes the zVWS *native* z/VM web server**
 - UI is completely browser-based
 - (no Java!, nothing installed on workstation)
 - **Installs in about 10 minutes onto zVPS managed LPAR**
- **Authentication support via zVWS**
 - VM / LDAP / AD / your own
- **Extensible**
 - Can define and “plug in” site-defined services
 - Easily tailored by z/VM systems programmers
 - **RESTFUL APIs**
- **Provides directory management**
 - zDIRECT provides Directory Management - with or without RACF

zPRO's Structure – Simple!



zDIRECT

- Updates directory
- Non-intrusive
- Multi-user
- No “oops”

Auditing














zPRO Enterprise Cloud Management VSIVM4

DEMOSYS CUSTOMER DEVELOPMENT

RKSDEV
Settings

Change Password
Job Queue
Audit Log
Show Notifications
Report Bug
Diag Console
About zPRO
Logout

Audit Log

Audit Log		X	Search Criteria
			
	01/07/2020 - 06:15:31.335888	DEMOSYS	-System- ZPRUNQUO: Processing 43 server entries from EXPIRING ZPFILE
	01/07/2020 - 06:00:38.695411	DEMOSYS	RKSDEV ZPFINCLN: User RKSSVR10 located: IP - 1 THIS 10.0.0.13
	01/07/2020 - 06:00:38.692489	DEMOSYS	RKSDEV ZPFINCLN: User RKSSVR10 located: OSA - DECREASE 0
	01/07/2020 - 06:00:38.689946	DEMOSYS	RKSDEV ZPFINCLN: User RKSSVR10 located: MDISK - 1
	01/07/2020 - 06:00:38.687198	DEMOSYS	RKSDEV ZPFINCLN: User RKSSVR10 located: VCPUS - 1
	01/07/2020 - 06:00:38.684618	DEMOSYS	RKSDEV ZPFINCLN: User RKSSVR10 located: VSTOR - 256 MB
	01/07/2020 - 06:00:38.681980	DEMOSYS	RKSDEV ZPFINCLN: User RKSSVR10 successfully cloned by Rich Smrcina from golden image GOLDRL74
	01/07/2020 - 06:00:38.538976	DEMOSYS	RKSDEV ZPFINCLN: RKSSVR10 has been autostarted
	01/07/2020 - 06:00:38.523102	DEMOSYS	RKSDEV SENDACK: Results of sending email for RKSSVR10 to rich@velocitysoftware.com - ZPEmail 0
	01/07/2020 - 06:00:38.286316	DEMOSYS	RKSDEV ZPFINCLN: Invoking DEMOACK for RKSSVR10 with NEWLNXU RKSSVR10 QUIET Rich Smrcina EMAIL=rich@velocitysoftware.com

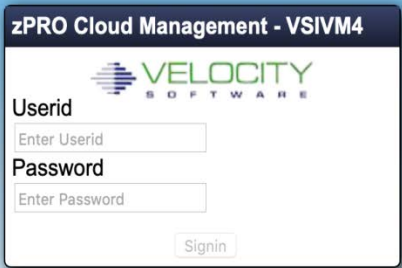
- **zPRO Focus:**
 - **Simplifying access** and acceptance of the mainframe for new, younger and possibly less skilled team members through a browser-based interface
 - Providing a **On-Prem cloud-based** facility for mainframe **training**, especially around cloud and guest management (supports Linux, CMS, z/VSE)
 - Simplifying daily tasks by **empowering** end-users to manage their own guests while *you* still control authorities and resources (Functional Decentralization)
 - Simplifying z/VM systems management for Systems Programmers

Velocity's zPRO Cloud Demo Site

- **To register:**
<https://demo.velocitysoftware.com/zpro/>
 - **Userid: demozpro**
 - **Password: demodemo**
- **Check your email for your login info**

Our Cloud Demo site will allow you to register for your own userid. You can then use that userid to create, manipulate and use a selection of servers through zPRO.

It is a full zPRO system that is running the same code we ship to our customers. **Note** that Demo userids only have access to a subset of zPRO functions and are limited in authorizations.




**Welcome to the
Velocity Software zPRO Demo Site**

Velocity Software maintains a cloud for demonstration purposes and for supporting your education needs.

If you do not yet have a Demo System userid, login with the userid of **DEMOZPRO** and password **DEMODEMO** to create one.

If you need assistance, contact support@velocitysoftware.com



Cloud on z with zPRO is VERY easy

- Native web server (zVWS)
- Easy interface
- Very reliable

zPRO Installs in minutes

Tailoring:

- Choose directory manager (DirMaint, VM:Secure, zDIRECT)
- Assign existing servers
- Define IP addresses
- Define disk pool
- Define users, groups