

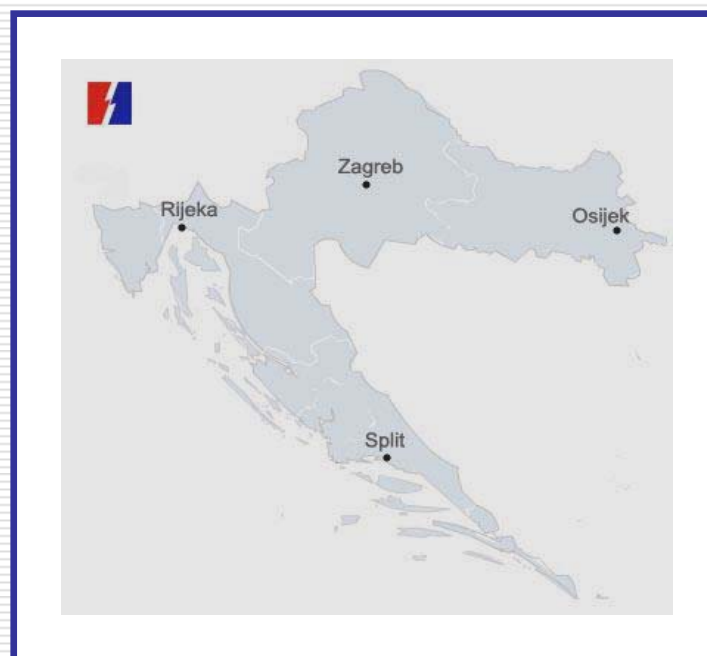
# **CLUSTER iAS-a NA HYPER-V ZA KAPACITET I RASPOLOŽIVOST**

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**Dubravko Miljković**  
**HEP-SIT**  
**Zagreb**

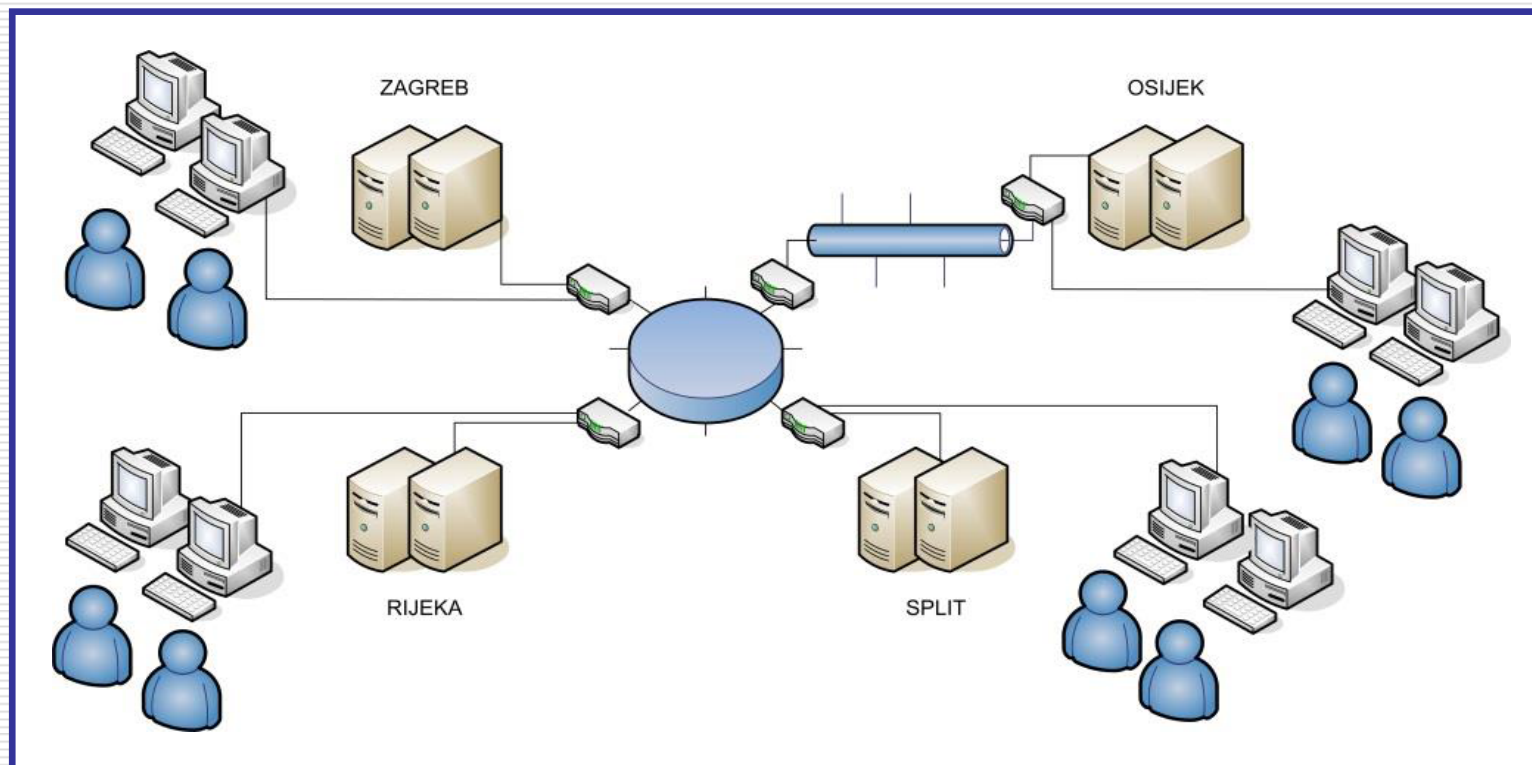
# Opis dosadašnje infrastrukture aplikacijskih servera

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**Centri dosadašnjeg geografski disperziranog clustera aplikacijskih servera**

# Opis dosadašnje infrastrukture aplikacijskih servera



## Mrežna povezanost centara u dosadašnjem rješenju

# Opis dosadašnje infrastrukture aplikacijskih servera

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- ❑ Inicijalno 2 servera po centru – 8 servera
- ❑ Kasnije instalacija narasla na 16 servera
  - Zagreb 7 servera
  - Split 5 servera
  - Rijeka 2 servera
  - Osijek 2 servera
- ❑ Glomazno rješenje, ali izrazito redundantno
- ❑ 10 godina pouzdanog rada

# NLB cluster internet aplikacijskih servera (Oracle iAS-a)

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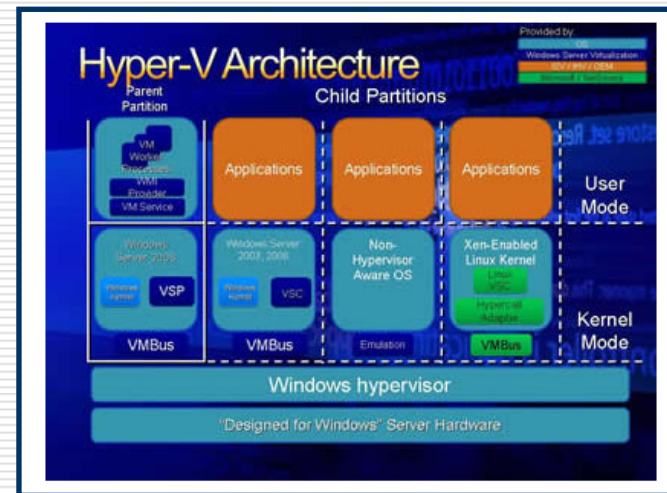
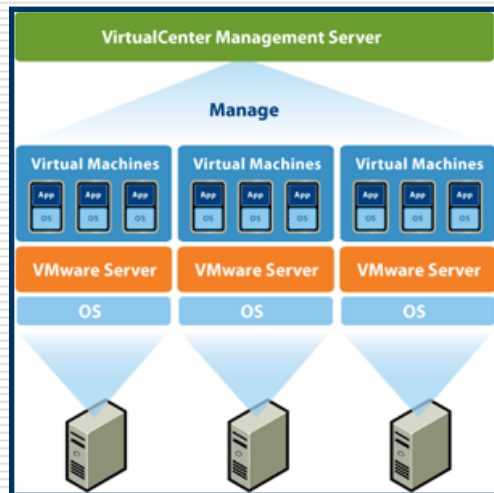
- Dvije Hyper-V platforme (Windows 2012)
  - szg01hvias01
  - szg01hvias02
  
- 12 iAS-a instaliranih na virtualnim serverima
  - Windows 2008 SP2 operacijski sustav
  - dimenzionirani za do 250 istovremenih korisnika
  - szg01vias01 – szg01vias12

# Zašto virtualizacija

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- Prvenstveno licenčne prednosti
- Manji broj fizičkih servera
- Manji troškovi održavanja servera
  - Prašinu možete usisati i sami
- Da li u sustavima poput HEP-a ovakve ušteda ima smisla?
  - Svaka ušteda je dobra, ali ih ipak treba staviti u perspektivu

# Zašto Hyper-V



- ❑ I VMWare i Hyper-V su zreli proizvodi
- ❑ iAS-i su instalirani na Windowsima
- ❑ Povoljnije licenciranje Hyper-V za Windows 2012 Datacenter Edition
  - Unlimited virtualization rights

# Oracle licenciranje

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- Dva načina licenciranja
  - Per named user
  - Per CPU
- Virtualizacija
  - Ako se ne koristi Oracle VM, proizvod mora biti licenciran za sve CPU (procesore) na serveru
  - Povoljno npr. kad se koristi jedan proizvod na serveru na svim procesorima
- Alternativa novom rješenju?
  - Povaditi/disable procesore iz servera postojećeg geografski disperziranog clustera



# Dvije Hyper-V platforme Hardware

- HP DL380 G8
  - 2 x šesterojezgreni Intel Xeon E5-2640 na 2.5 GHz
  - 96 GB RAM
  - 4 x 146 GB HDD 15k (po 2 diska u RAID 1 polju za OS)
  - 8 x 600 GB HDD 10k (po 4 diska u RAID 5 polju za virtualne iAS-e)
  - 6 mrežnih 1 Gbit Ethernet kartica



## Zašto stari iAS 1.0.2?

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- Forms/Reports 6
  - Starija tehnologija
  - Prokušano i pouzdano
  - Radi čak i pdf font embedding
  - Portfolio od 50+ aplikacija
- Forms 10i Weblogic 11/12 g
  - Novija tehnologija, ali
  - Zanimariva dobit, velik posao konverzije i testiranja
- Krajnji korisnik praktički ne vidi nikakvu razliku
  - Aktivni grafovi (2D grafovi postaju 3D pod mišem)

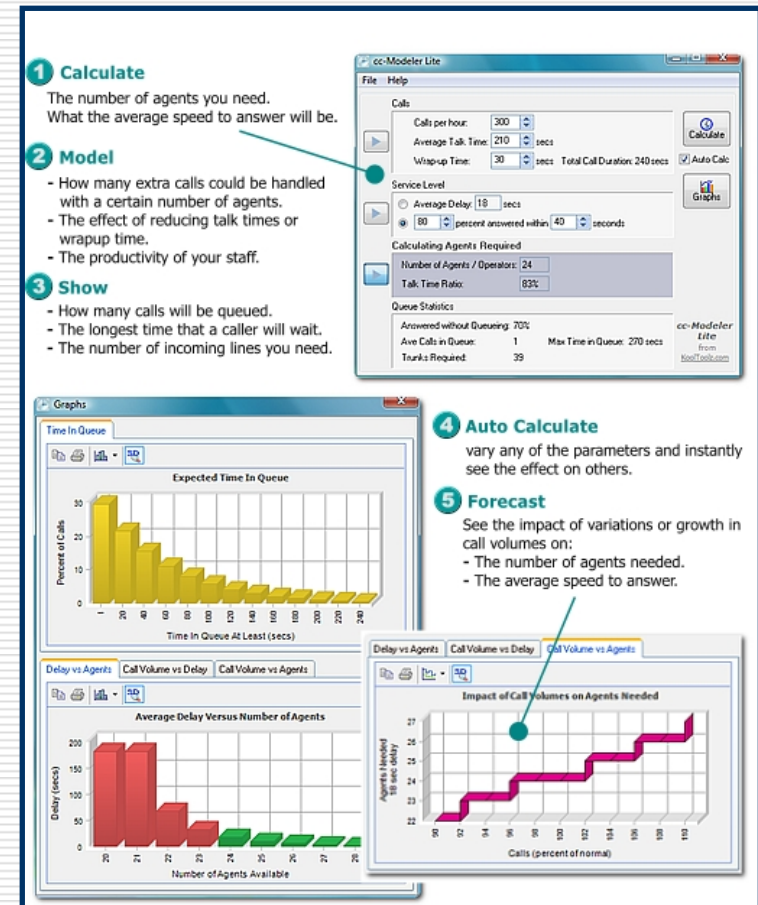
# Zašto baš 250 istovremenih korisnika?

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- ❑ Forms procesa moglo bi biti i više
  - Windows non-interactive desktop heap size
  
- ❑ In-Process Reports
  - Samo jedan report istovremeno  
(na Forms/Reports 6)
  
- ❑ Stand Alone Reports Server
  - Proizvoljni broj istovremenih reporta  
(specificirano sa brojem reports engines)
  
- ❑ Oko 200 po starom programu

# Queueing theory za reports server

- In-process reporti
  - Samo jedan engine bez uobičajenih parametara
    - initEngine
    - minEngine
    - maxEngine
  - Do 150 istovremenih korisnika nema problema
  - 150 - 200 manje čekanje
  - 200 - 250 veliko čekanje
  - 250+ nikad dočekati (ovisi o reportima, naš slučaj)



**1 Calculate**  
The number of agents you need. What the average speed to answer will be.

**2 Model**

- How many extra calls could be handled with a certain number of agents.
- The effect of reducing talk times or wrapup time.
- The productivity of your staff.

**3 Show**

- How many calls will be queued.
- The longest time that a caller will wait.
- The number of incoming lines you need.

**4 Auto Calculate**  
vary any of the parameters and instantly see the effect on others.

**5 Forecast**  
See the impact of variations or growth in call volumes on:

- The number of agents needed.
- The average speed to answer.

The screenshot shows the 'cc-Modeler Lite' interface with the following settings:

- File: Help
- Calculate: [button]
- Auto Calc: [checkbox checked]
- Graphs: [button]
- Queue Statistics: Answered without Queuing: 70%, Ave Calls in Queue: 1, Max Time in Queue: 270 secs, Trunks Required: 39

The 'Graphs' window displays three charts:

- Expected Time In Queue:** A bar chart showing the percentage of calls versus the time in queue at least (secs).
- Average Delay Versus Number of Agents:** A bar chart showing delay (secs) versus the number of agents available.
- Impact of Call Volumes on Agents Needed:** A line graph showing the number of agents needed to meet a delay versus call volume (percent of normal).

## iAS na Windows 2008

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- ❑ iAS 1.0.2.2.2a namijenjen za Windows 2000
- ❑ Ne da se instalirati na Windows 2008
  - Čak ni primjenom uobičajenih trikova kao Compatibility Mode itd.
- ❑ Windows Server 2008 – 32 bit
- ❑ Kopirana jedna postojeća instalacija s Windows 2000 Server
  - Preseljena struktura direktorija
  - Izmijenjene sve Oracle datoteke s nazivima stroja
  - Izmijenjen Windows registry
  - I još ponešto sitno

## Broj nodova - 12

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- ❑ 2000 istovremenih korisnika
  - 167 po nodu - optimalna performansa
- ❑ Max. 3000 istovremenih korisnika
  - 250 po nodu – malo sporiji in-process reporti
- ❑ Ispad jednog noda neznatno utječe na cjelokupni kapacitet
  - 8.3% korisnika puca sesija
  - U tipičnoj slučaju samo jedan korisnik u uredu doživljava problem, drugima sustav radi
  - Pomišlja da je problem u njegovom PC-ju
- ❑ Ispad jedne Hyper-V platforme sa 6 nodova još uvijek osigurava uslugu za 1500 korisnika

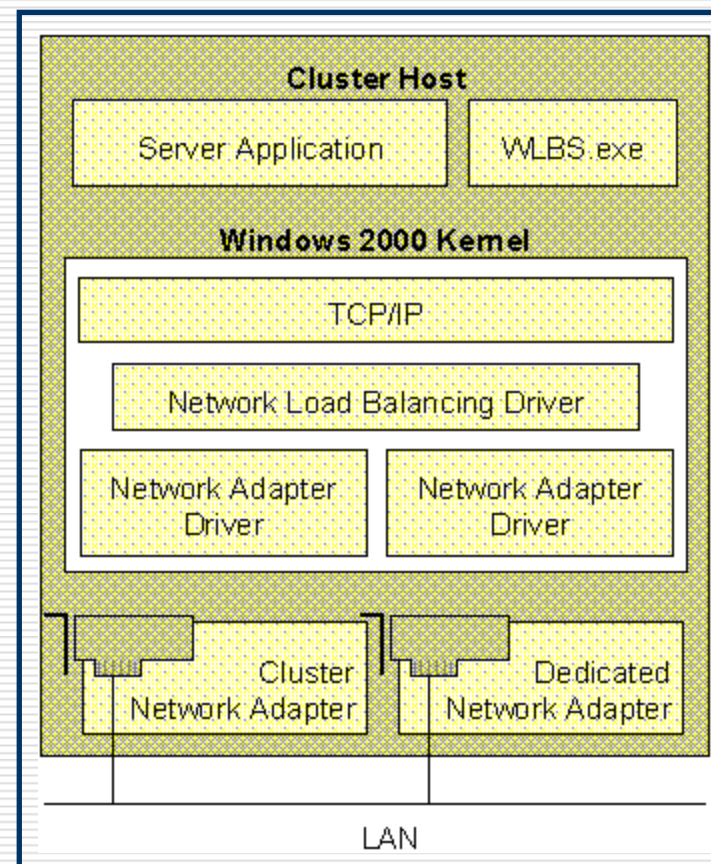
# Visoka raspoloživost High Availability (HA)

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- Uporaba Microsoft NLB (Network Load Balancing)
  - Svi nodovi ravnopravno pristupaju mreži (bus struktura)
  - Ne postoji jedna točka prekida (Single Point of Failure)
  - Korisnici se raspodjeljuju na temelju broja konekcija stohastičkom procedurom
  - Kod velikog broja korisnika opterećenje je ravnomjerno raspoređeno na sve nodove (zakon velikih brojeva)

# Visoka raspoloživost High Availability (HA)

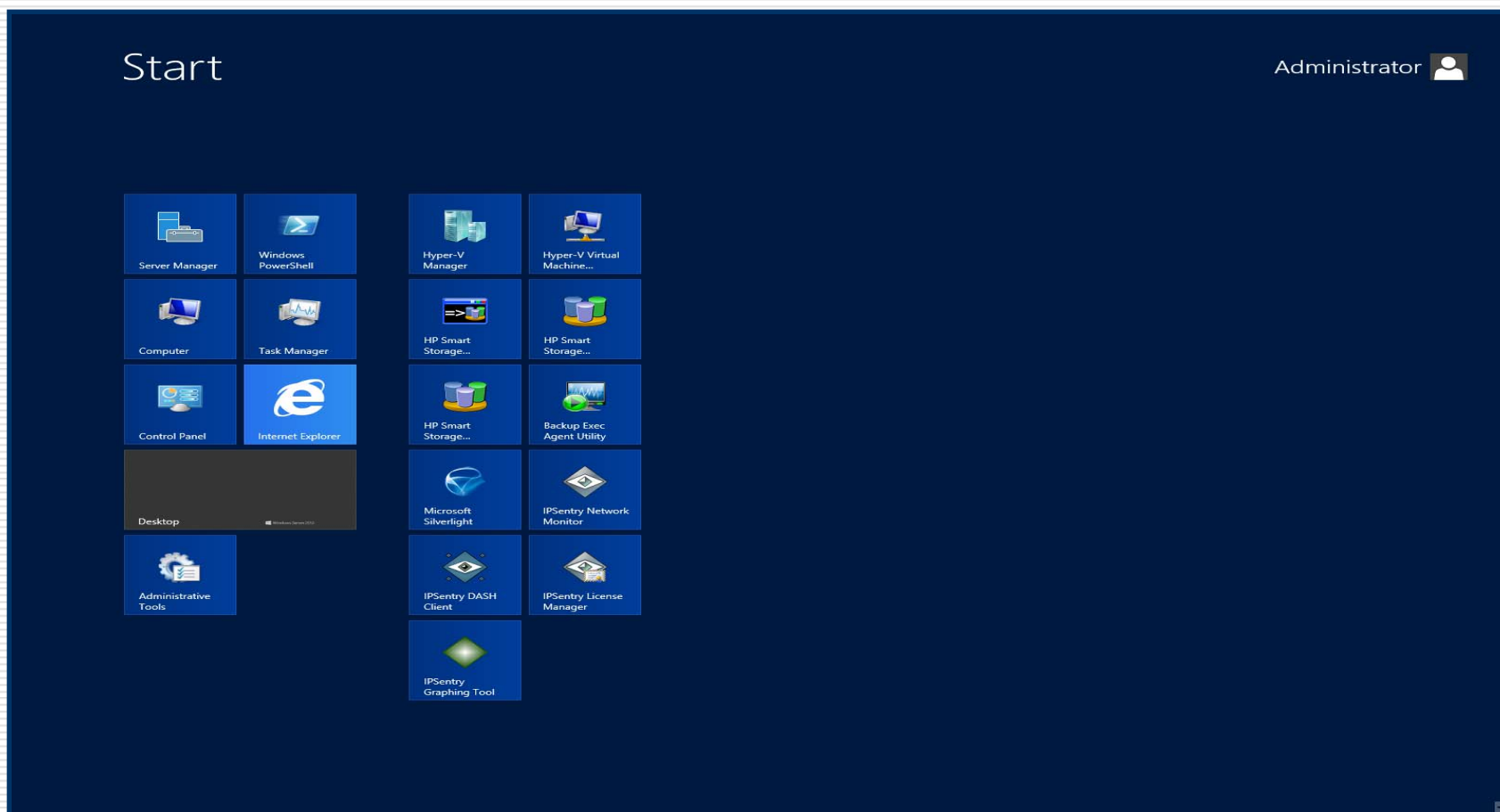
- NLB sa dvije virtualne kartice po virtualnom stroju
  - Unicast mode
- NLB (Cluster) kartica
  - Dolazni promet
- Dedicated kartica
  - Izlazni promet sa virtualnog stroja
- Microsoft NLB je dobro i jeftino rješenje, čak i za goleme promete



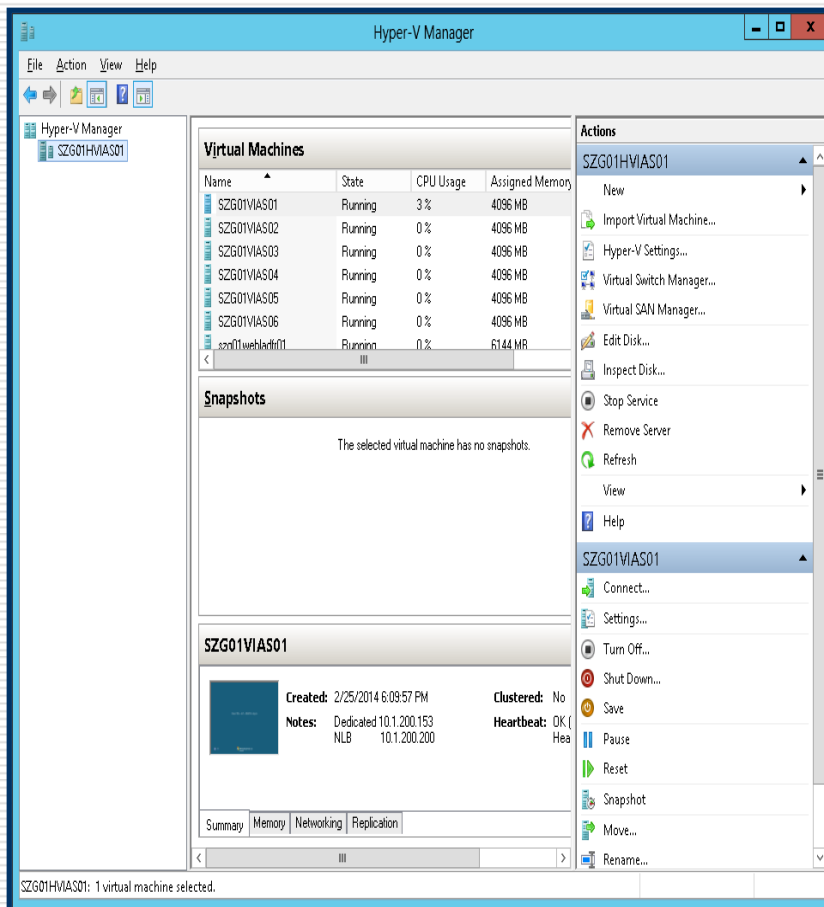


# Hyper-V platforma

## Windows 2012 Server sa Hyper-V rolom



# NLB - po 6 virtualnih strojeva na svakoj Hyper-V platformi: Hyper-V Instanca 1 i Hyper-V Instanca 2

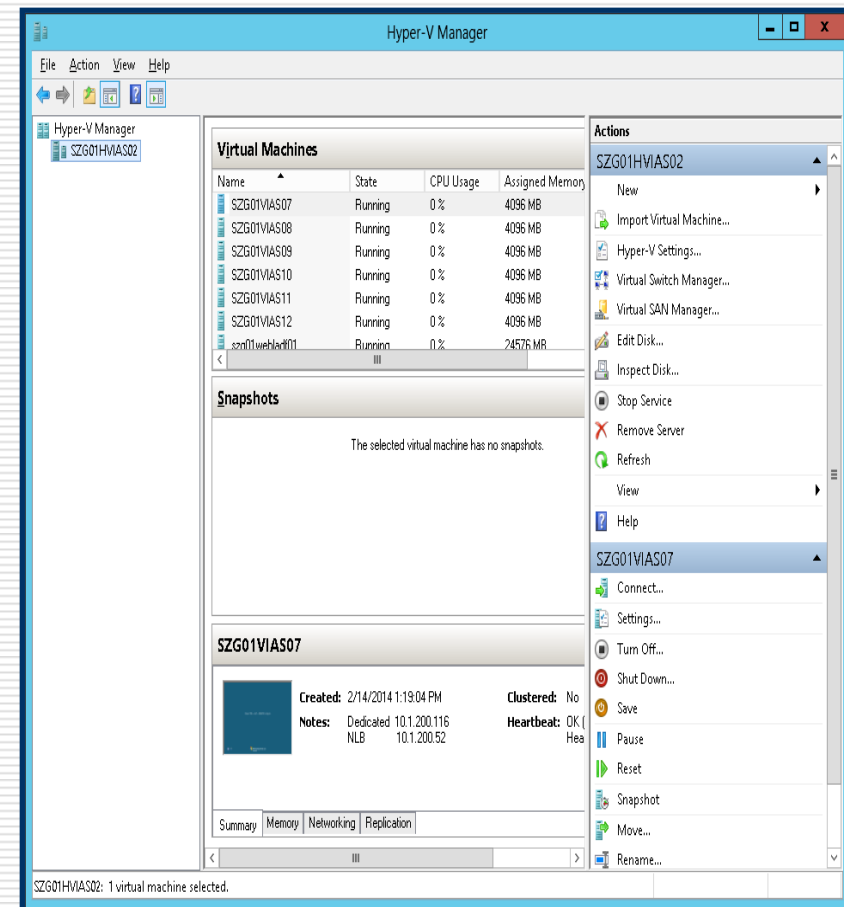


Hyper-V Manager - Instance 1 (SZG01HVIAS01)

Name	State	CPU Usage	Assigned Memory
SZG01VIAS01	Running	3%	4096 MB
SZG01VIAS02	Running	0%	4096 MB
SZG01VIAS03	Running	0%	4096 MB
SZG01VIAS04	Running	0%	4096 MB
SZG01VIAS05	Running	0%	4096 MB
SZG01VIAS06	Running	0%	4096 MB
szg01weblad01	Running	0%	6144 MB

Selected VM: SZG01VIAS01

Created: 2/25/2014 6:09:57 PM  
 Notes: Dedicated 10.1.200.153 NLB 10.1.200.200  
 Clustered: No  
 Heartbeat: OK



Hyper-V Manager - Instance 2 (SZG01HVIAS02)

Name	State	CPU Usage	Assigned Memory
SZG01VIAS07	Running	0%	4096 MB
SZG01VIAS08	Running	0%	4096 MB
SZG01VIAS09	Running	0%	4096 MB
SZG01VIAS10	Running	0%	4096 MB
SZG01VIAS11	Running	0%	4096 MB
SZG01VIAS12	Running	0%	4096 MB
szg01weblad01	Running	0%	24576 MB

Selected VM: SZG01VIAS07

Created: 2/14/2014 1:19:04 PM  
 Notes: Dedicated 10.1.200.116 NLB 10.1.200.52  
 Clustered: No  
 Heartbeat: OK

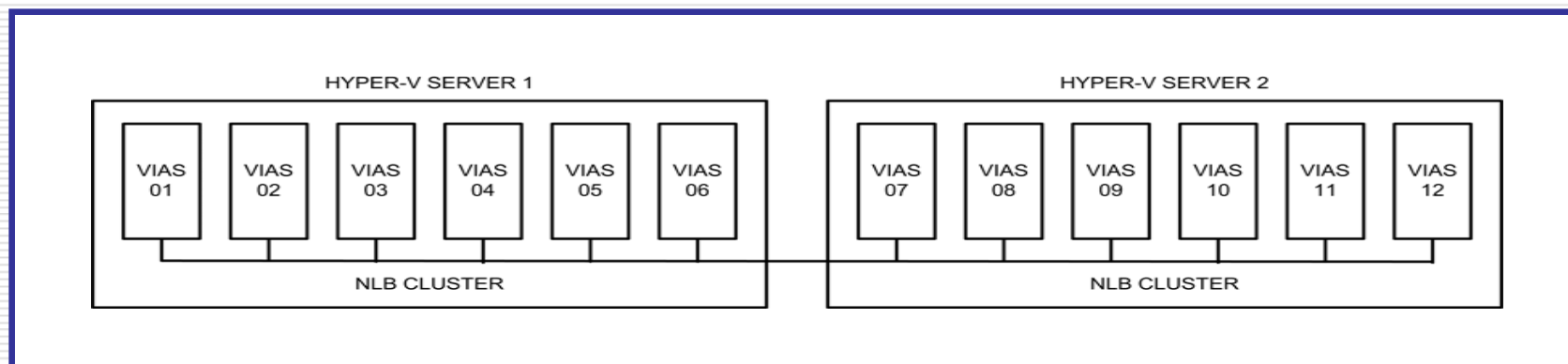
# NLB cluster internet aplikacijskih servera (Oracle iAS-a)

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- ❑ Ukupno opterećenje clustera je oko 1800-2000 istovremenih korisnika
- ❑ Maksimalno opterećenje je oko 3000 istovremenih korisnika
  - Uz smanjenu performansu
    - ❑ Dulje vrijeme uspostave sesije
    - ❑ Dulje čekanje na in-process reporte (jedan engine)
- ❑ Privremeno opterećenje 6 iAS-a na jednoj Hyper-V platformi: 1500
- ❑ Ako padne jedna Hyper-V platforma 1500 korisnika može se odmah rekonektirati

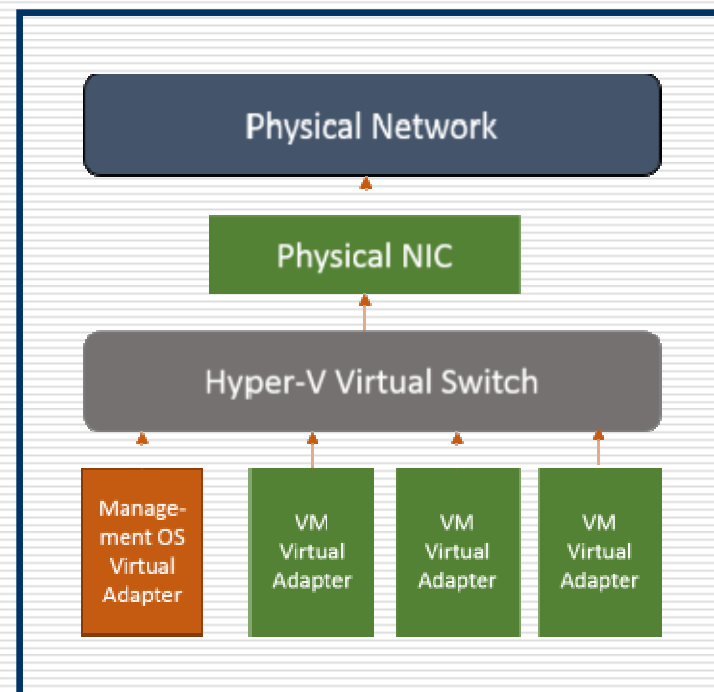
# Visoka raspoloživost High Availability (HA)

- Dvije Hyper-V platforme
- NLB uključuje sve virtualne iAS-e na obje platforme

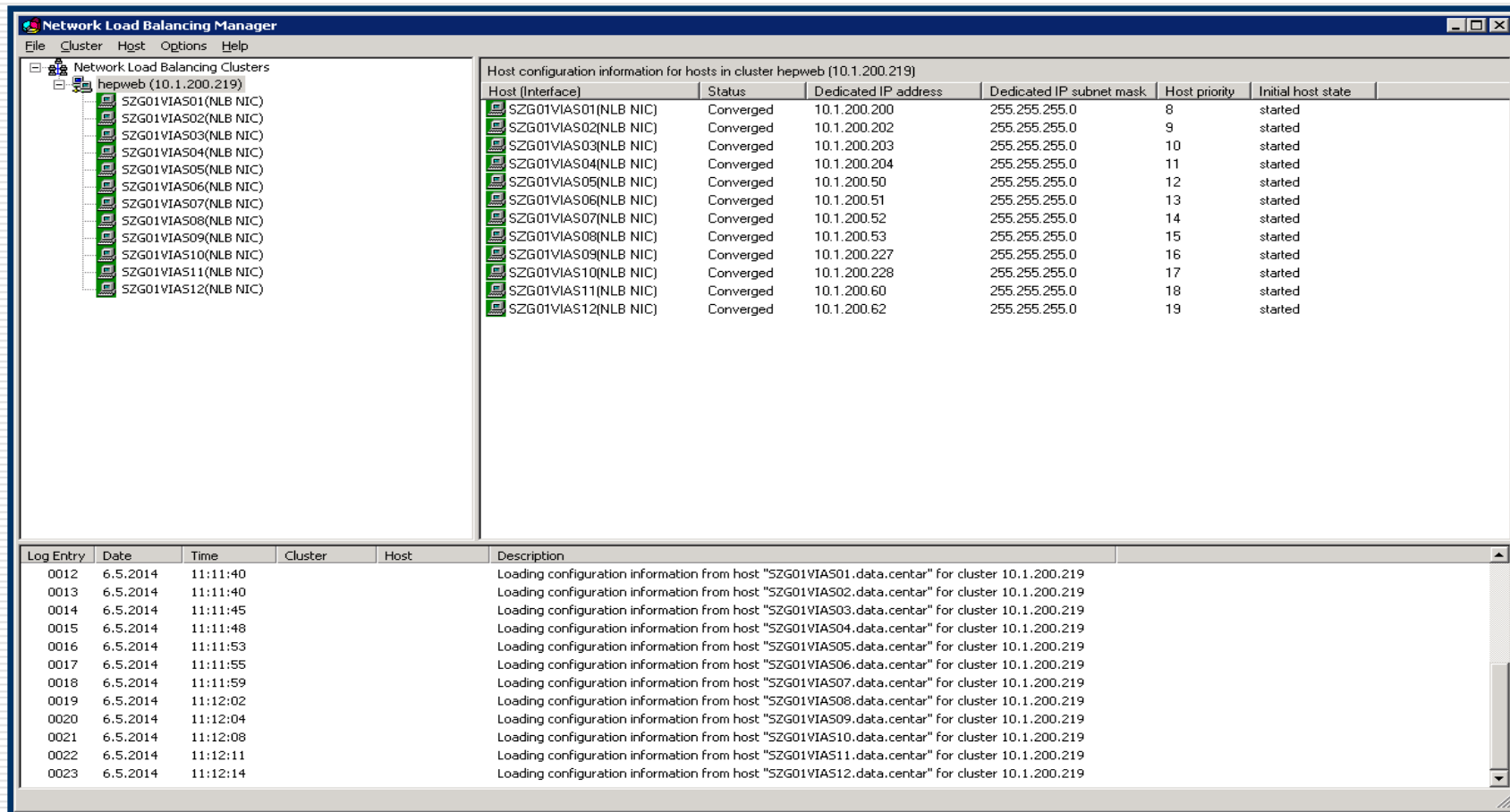


# Hyper-V platforma virtual switch

- ❑ External virtual switch
  - Osigurava komunikaciju između
    - ❑ Fizičke mreže
    - ❑ Management operating sustava
    - ❑ VM - virtualnih strojeva
  - Spojen na fizičke adaptere
  - Network teaming
- ❑ VM – virtualni strojevi
  - Komuniciraju svaki preko dva Virtual NIC-a



# Visoka raspoloživost High Availability (HA)



Network Load Balancing Manager

File Cluster Host Options Help

Network Load Balancing Clusters

- hepweb (10.1.200.219)
  - SZG01VIAS01(NLB NIC)
  - SZG01VIAS02(NLB NIC)
  - SZG01VIAS03(NLB NIC)
  - SZG01VIAS04(NLB NIC)
  - SZG01VIAS05(NLB NIC)
  - SZG01VIAS06(NLB NIC)
  - SZG01VIAS07(NLB NIC)
  - SZG01VIAS08(NLB NIC)
  - SZG01VIAS09(NLB NIC)
  - SZG01VIAS10(NLB NIC)
  - SZG01VIAS11(NLB NIC)
  - SZG01VIAS12(NLB NIC)

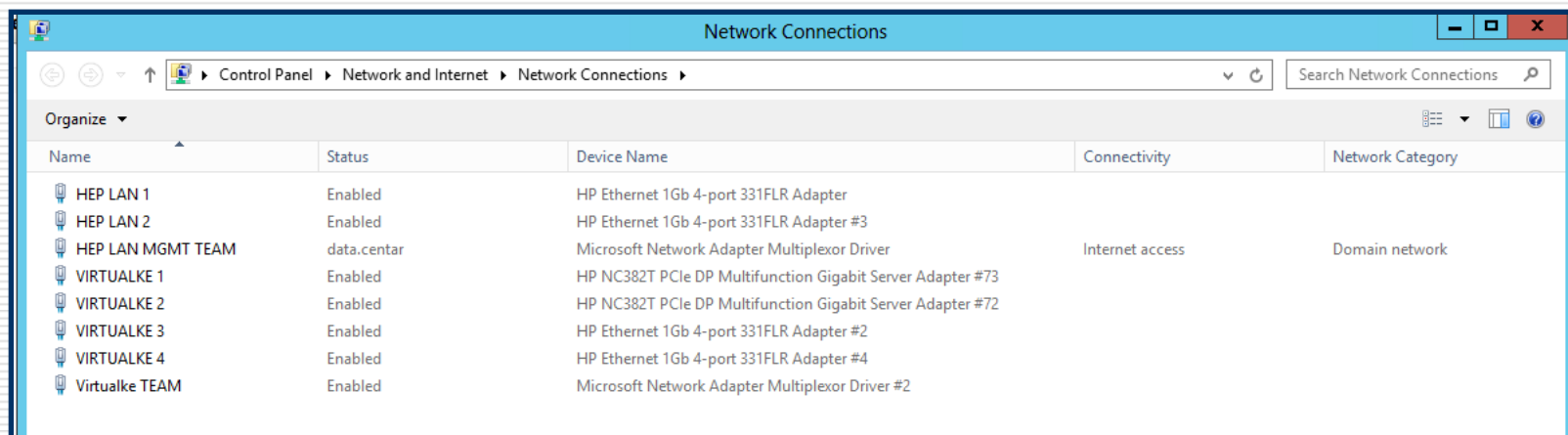
Host configuration information for hosts in cluster hepweb (10.1.200.219)

Host (Interface)	Status	Dedicated IP address	Dedicated IP subnet mask	Host priority	Initial host state
SZG01VIAS01(NLB NIC)	Converged	10.1.200.200	255.255.255.0	8	started
SZG01VIAS02(NLB NIC)	Converged	10.1.200.202	255.255.255.0	9	started
SZG01VIAS03(NLB NIC)	Converged	10.1.200.203	255.255.255.0	10	started
SZG01VIAS04(NLB NIC)	Converged	10.1.200.204	255.255.255.0	11	started
SZG01VIAS05(NLB NIC)	Converged	10.1.200.50	255.255.255.0	12	started
SZG01VIAS06(NLB NIC)	Converged	10.1.200.51	255.255.255.0	13	started
SZG01VIAS07(NLB NIC)	Converged	10.1.200.52	255.255.255.0	14	started
SZG01VIAS08(NLB NIC)	Converged	10.1.200.53	255.255.255.0	15	started
SZG01VIAS09(NLB NIC)	Converged	10.1.200.227	255.255.255.0	16	started
SZG01VIAS10(NLB NIC)	Converged	10.1.200.228	255.255.255.0	17	started
SZG01VIAS11(NLB NIC)	Converged	10.1.200.60	255.255.255.0	18	started
SZG01VIAS12(NLB NIC)	Converged	10.1.200.62	255.255.255.0	19	started

Log Entry	Date	Time	Cluster	Host	Description
0012	6.5.2014	11:11:40			Loading configuration information from host "SZG01VIAS01.data.centar" for cluster 10.1.200.219
0013	6.5.2014	11:11:40			Loading configuration information from host "SZG01VIAS02.data.centar" for cluster 10.1.200.219
0014	6.5.2014	11:11:45			Loading configuration information from host "SZG01VIAS03.data.centar" for cluster 10.1.200.219
0015	6.5.2014	11:11:48			Loading configuration information from host "SZG01VIAS04.data.centar" for cluster 10.1.200.219
0016	6.5.2014	11:11:53			Loading configuration information from host "SZG01VIAS05.data.centar" for cluster 10.1.200.219
0017	6.5.2014	11:11:55			Loading configuration information from host "SZG01VIAS06.data.centar" for cluster 10.1.200.219
0018	6.5.2014	11:11:59			Loading configuration information from host "SZG01VIAS07.data.centar" for cluster 10.1.200.219
0019	6.5.2014	11:12:02			Loading configuration information from host "SZG01VIAS08.data.centar" for cluster 10.1.200.219
0020	6.5.2014	11:12:04			Loading configuration information from host "SZG01VIAS09.data.centar" for cluster 10.1.200.219
0021	6.5.2014	11:12:08			Loading configuration information from host "SZG01VIAS10.data.centar" for cluster 10.1.200.219
0022	6.5.2014	11:12:11			Loading configuration information from host "SZG01VIAS11.data.centar" for cluster 10.1.200.219
0023	6.5.2014	11:12:14			Loading configuration information from host "SZG01VIAS12.data.centar" for cluster 10.1.200.219

# Visoka raspoloživost High Availability (HA)

- MGMT Team
  - Dvije fizičke kartice
- VM Team
  - Četiri fizičke kartice

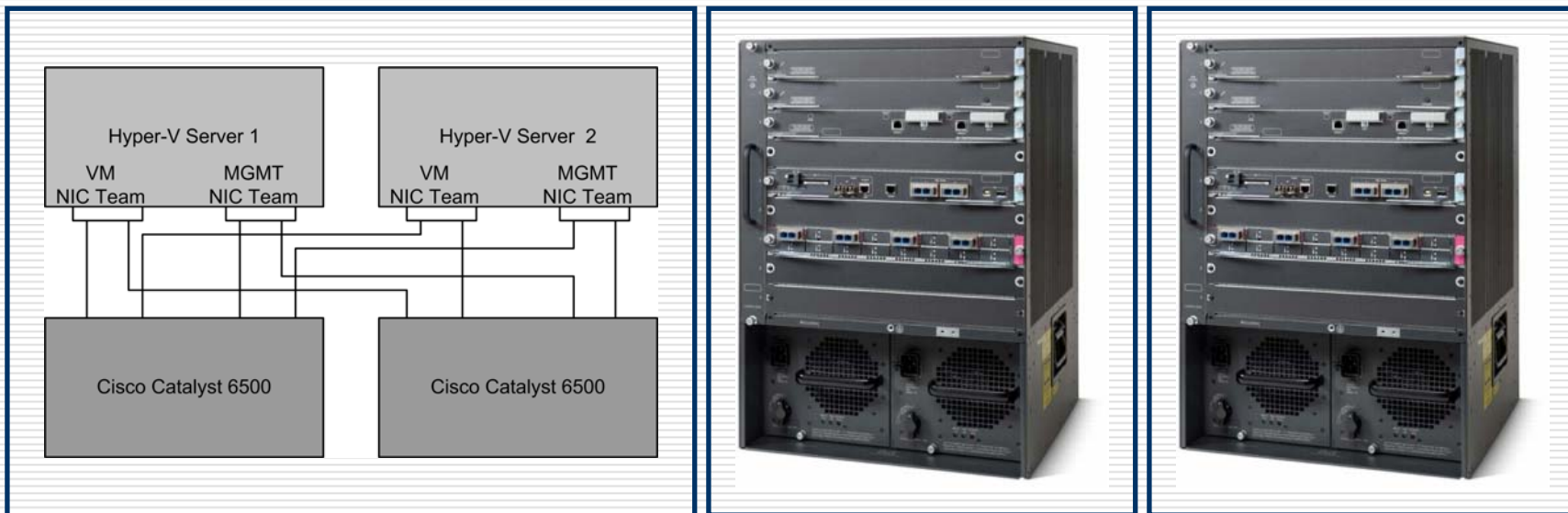


The screenshot shows the Windows Network Connections window. The title bar reads "Network Connections". The breadcrumb path is "Control Panel > Network and Internet > Network Connections". A search bar is present with the text "Search Network Connections". Below the breadcrumb is an "Organize" dropdown menu. The main content is a table with the following columns: Name, Status, Device Name, Connectivity, and Network Category.

Name	Status	Device Name	Connectivity	Network Category
HEP LAN 1	Enabled	HP Ethernet 1Gb 4-port 331FLR Adapter		
HEP LAN 2	Enabled	HP Ethernet 1Gb 4-port 331FLR Adapter #3		
HEP LAN MGMT TEAM	data.centar	Microsoft Network Adapter Multiplexor Driver	Internet access	Domain network
VIRTUALKE 1	Enabled	HP NC382T PCIe DP Multifunction Gigabit Server Adapter #73		
VIRTUALKE 2	Enabled	HP NC382T PCIe DP Multifunction Gigabit Server Adapter #72		
VIRTUALKE 3	Enabled	HP Ethernet 1Gb 4-port 331FLR Adapter #2		
VIRTUALKE 4	Enabled	HP Ethernet 1Gb 4-port 331FLR Adapter #4		
Virtualke TEAM	Enabled	Microsoft Network Adapter Multiplexor Driver #2		

# Visoka raspoloživost High Availability (HA) 2 x Cisco Catalyst 6500 Switch

- Fizičke mrežne kartice su u teaming-u
  - Polovica fizičkih kartica spojeno na jedan switch, druga polovica na drugi switch





# Affinity reset

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- ❑ NLB affinity: single
  - Zasnovan na IP adresi korisnika
  - Korisnik se tijekom sesije spaja na isti nod (i iAS)
- ❑ Affinity se gubi nakon zaustavljanja NLB-a
- ❑ Wlbs (Windows Load Balancing Service)
  - Start
  - Stop
- ❑ Procedura (tijekom noći)
  - wlbs stop
  - Pauza cca. 1 min
  - wlbs start
  - Nakon affinity reset-a svaki korisnik nanovo uspostavlja vezu s nekim od nodova (slučajan izbor)

# Nadzor nodova (OS + iAS) - IPSentry

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## IPSentry software

- Uključivanje funkcionalnog i isključivanje nefunkcionalnog noda iz NLB-a
  - wlbs start
  - wlbs stop
- Inicijalno stanje noda u NLB-u je neaktivno
  - Uključivanje tek kad se utvrdi ispravnost noda
- Nadzor i restart komponente ili cijelog noda (ovisno o potrebi)
  - Web i Forms (Apache)
  - Reports serveri

# Nadzor iAS-a - IPSentry

IP Sentry Device Editor v 6.0.3

Action View Tools Help

Available Entries

- (default)
  - szg01 vias01
  - szg01 vias02
  - szg01 vias03
  - szg01 vias04
  - szg01 vias05
  - szg01 vias06

Entry Details

Name	Type	Description
szg01 vias01	TCP/IP	Default configuration temp

```

9/24/2014@15:33>Loading configuration. . .
9/24/2014@15:33>Loaded 7 entries.
9/24/2014@15:33>Finished.
    
```

Press <F1> for Help

IP Sentry Device Editor v 6.0.3

Action View Tools Help

Available Entries

- (default)
  - szg01 vias07
  - szg01 vias08
  - szg01 vias09
  - szg01 vias10
  - szg01 vias11
  - szg01 vias12

Entry Details

Name	Type	Description
szg01 vias07	TCP/IP	Default configuration temp

```

9/24/2014@15:37>Loading configuration. . .
9/24/2014@15:37>Loaded 7 entries.
9/24/2014@15:37>Finished.
    
```

Press <F1> for Help

# Status reports servera nadzor brojnih reports servera

Oracle Reports CGI server - Windows Internet Explorer

http://szg01vias01/dev60cgj/rwcg60/showmyjobs?server=pperep

File Edit View Favorites Tools Help

Oracle Reports CGI server

## Status reda servera izvještaja

Red na serveru pperep, na Rujan , 24 2014, 16:01:57

Za uklanjanje trenutnog (stavljenog u red ili raspoređenog) posla, ili za dobivanje cache-iranog izlaza uspješno dovršenog prošlog posla, kliknite na Status posla hiperlink za taj posao (ako je dostupan).

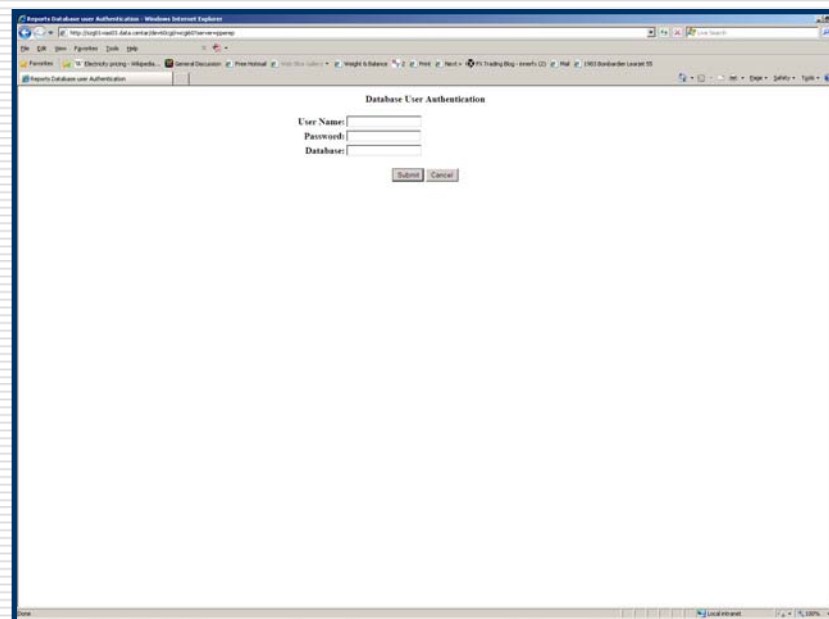
- Trenutni poslovi: **Ništa**
- Prošli poslovi:
 

ID posla	Naziv posla	Status posla	Vlasnik posla	Tip izlaza	Naziv izlaza	Server Name	Uvršten u red u	Započeo u	Završio u
18	BLST_DNEVNIK	<a href="#">Završeno</a>	Administrator	Cache		pperep	09/22/14, 14:34:09	09/22/14, 14:34:10	09/22/14, 14:34:10
17	BLST_DNEVNIK	<a href="#">Završeno</a>	Administrator	Cache		pperep	09/22/14, 14:31:57	09/22/14, 14:31:58	09/22/14, 14:31:58
16	BLST_DNEVNIK	<a href="#">Završeno</a>	Administrator	Cache		pperep	09/22/14, 14:17:01	09/22/14, 14:17:02	09/22/14, 14:17:02
15	BLST_DNEVNIK	<a href="#">Završeno</a>	Administrator	Cache		pperep	09/22/14, 14:07:29	09/22/14, 14:07:30	09/22/14, 14:07:31
14	BLST_DNEVNIK	<a href="#">Završeno</a>	Administrator	Cache		pperep	09/12/14, 12:20:01	09/12/14, 12:20:01	09/12/14, 12:20:01
13	BLST_DNEVNIK	<a href="#">Završeno</a>	Administrator	Cache		pperep	09/12/14, 12:15:20	09/12/14, 12:15:20	09/12/14, 12:15:21
12	BLST_DNEVNIK	<a href="#">Završeno</a>	Administrator	Cache		pperep	09/12/14, 08:44:55	09/12/14, 08:44:55	09/12/14, 08:44:56
11	BLST_DNEVNIK	<a href="#">Završeno</a>	Administrator	Cache		pperep	09/12/14, 08:44:40	09/12/14, 08:44:40	09/12/14, 08:44:41
10	BLST_DNEVNIK	<a href="#">Završeno</a>	Administrator	Cache		pperep	09/12/14, 08:44:17	09/12/14, 08:44:17	09/12/14, 08:44:17
9	BLST_ISP_UPL REP	<a href="#">Završeno</a>	Administrator	Cache		pperep	09/12/14, 08:42:50	09/12/14, 08:42:50	09/12/14, 08:42:50
8	BLST_DNEVNIK	<a href="#">Završeno</a>	Administrator	Cache		pperep	09/12/14, 08:31:54	09/12/14, 08:31:54	09/12/14, 08:31:54
7	BLST_DNEVNIK	<a href="#">Završeno</a>	Administrator	Cache		pperep	09/12/14, 08:31:37	09/12/14, 08:31:38	09/12/14, 08:31:38
6	BLST_ISP_UPL_ZB REP	<a href="#">Završeno</a>	Administrator	Cache		pperep	09/12/14, 08:31:13	09/12/14, 08:31:13	09/12/14, 08:31:14
5	BLST_ISP_UPL REP	<a href="#">Završeno</a>	Administrator	Cache		pperep	09/12/14, 08:20:30	09/12/14, 08:20:30	09/12/14, 08:20:30
4	BLST_ISP_UPL REP	<a href="#">Završeno</a>	Administrator	Cache		pperep	09/12/14, 08:19:26	09/12/14, 08:19:26	09/12/14, 08:19:26
3	BLST_ISP_UPL REP	<a href="#">Završeno</a>	Administrator	Cache		pperep	09/12/14, 08:17:06	09/12/14, 08:17:06	09/12/14, 08:17:07
2	BLST_DNEVNIK	<a href="#">Završeno</a>	Administrator	Cache		pperep	09/11/14, 12:54:27	09/11/14, 12:54:27	09/11/14, 12:54:28
1	BLST_DNEVNIK	<a href="#">Završeno</a>	Administrator	Cache		pperep	09/11/14, 12:28:11	09/11/14, 12:28:11	09/11/14, 12:28:13
- Raspoređeni poslovi: **Ništa**

Local intranet 100%

# Status reports servera query string

- ❑ Funkcionalni query  
(obična provjera Windows servisa nije dovoljna):
  - <http://szg01vias01/dev60cgi/rwcgi60?server=pperep>
- ❑ Check response:
  - Npr. string "Database"
- ❑ Korektivna akcija
  - Restart reports servera
  - Mail notifikacija u slučaju neuspjelog restarta
    - ❑ Moguće kill-ati reports process i potom ga startati
    - ❑ rwmts60.exe



## Restart pojedinog noda

---

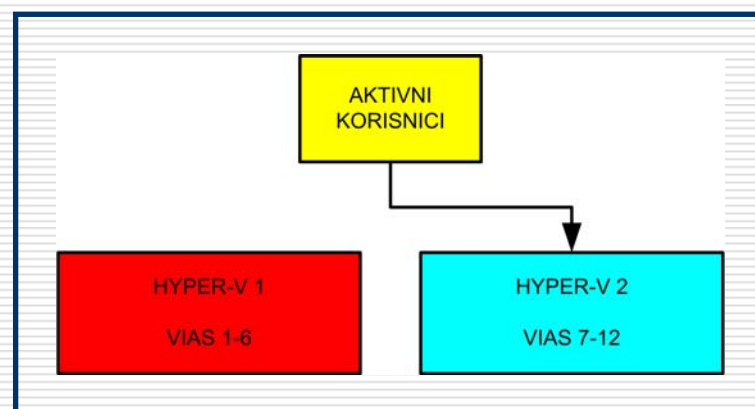
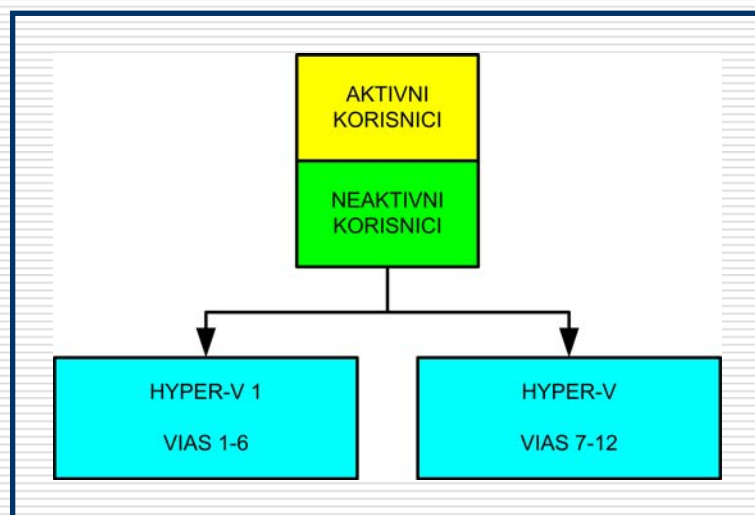
- Distribucija opterećenja
  - Ravnomjerno na 12 nodova (Load weigh - Equal)
  - Kod pada jednog noda preostaje 11 nodova (91.6%)
- Tranzijentni kvar
  - Nod se nakon automatskog restarta ponovo uključuje u cluster
  - Email notifikacija
- Permanentni kvar
  - Nod se ne uključuje u cluster (ozbiljniji kvar)
  - Email notifikacija

## Pad jedne virtualne platforme

---

- Korisnici spojeni na iAS-e instalirane na dotičnoj platformi
  - Pucaju sesije
  - Korisnici se trebaju se rekonektirati
- Platforma se restarta kroz nekoliko minuta
- Dio korisnika je spojen na aplikaciju, i aktivan je
  - Rekonektiraju se odmah
- Dio korisnika je spojen na aplikaciju, ali nije aktivan
  - Ne rekonektiraju se odmah

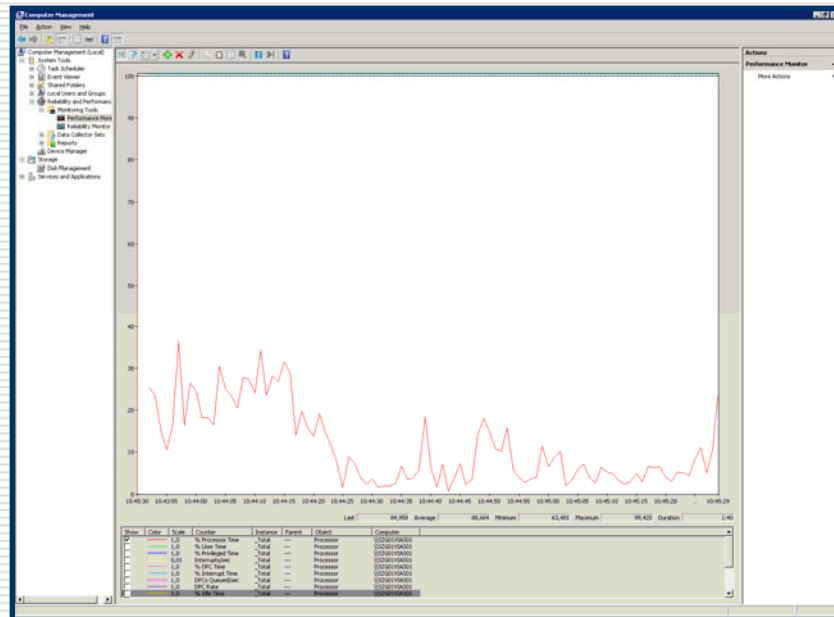
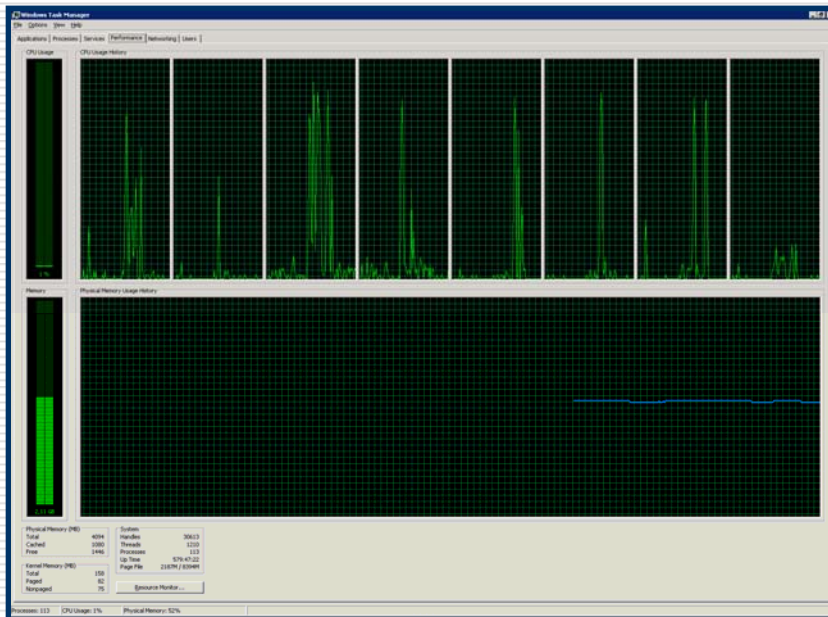
# Pad jedne virtualne platforme



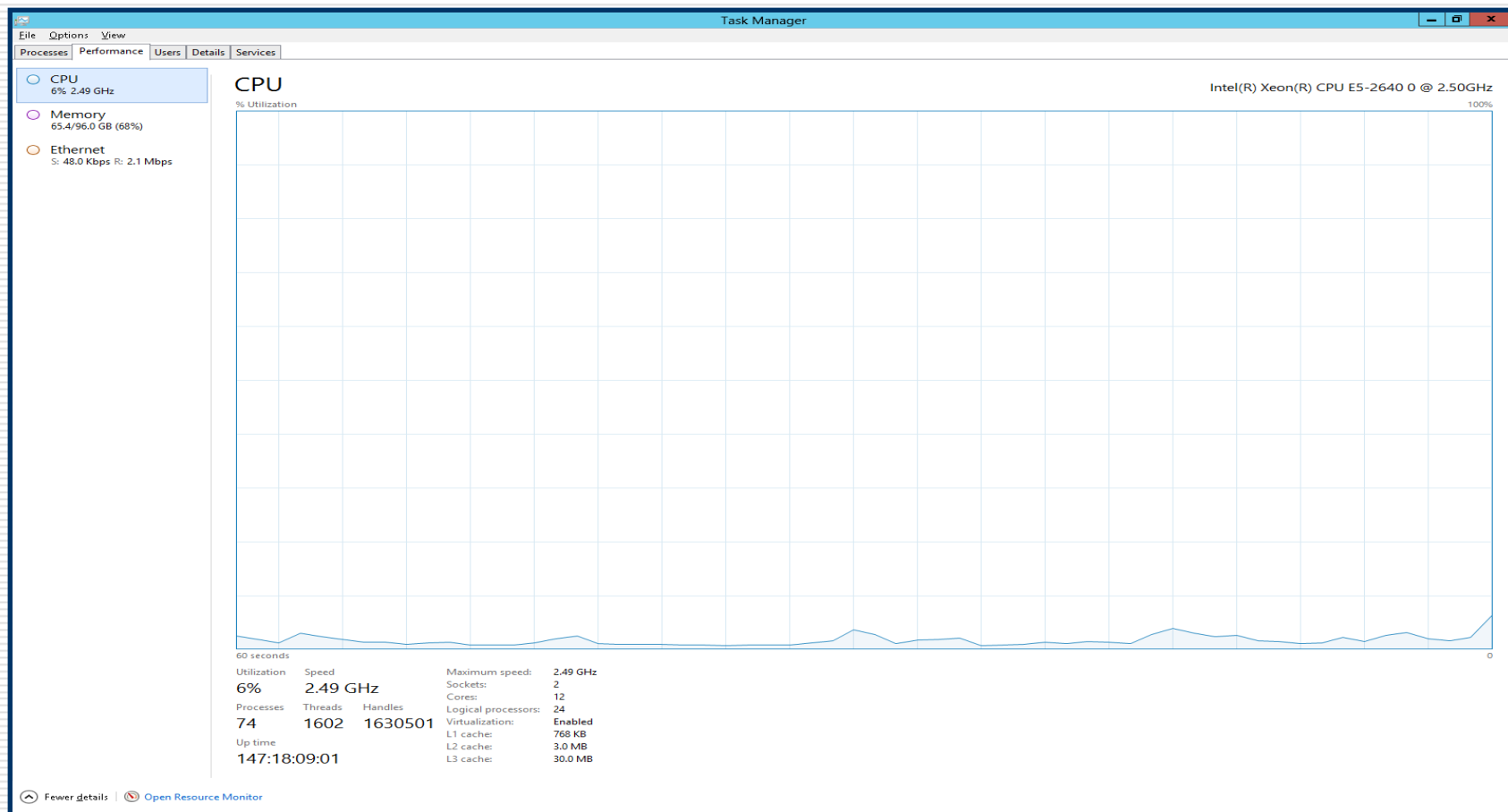
- Dio korisnika je loggiran, ali neaktivan
- Neaktivni korisnici neće se odmah spojiti na drugu virtualnu platformu
- Jedna virtualna platforma zadovoljava međuperiod dok se druga platforma restartom ne osposobi



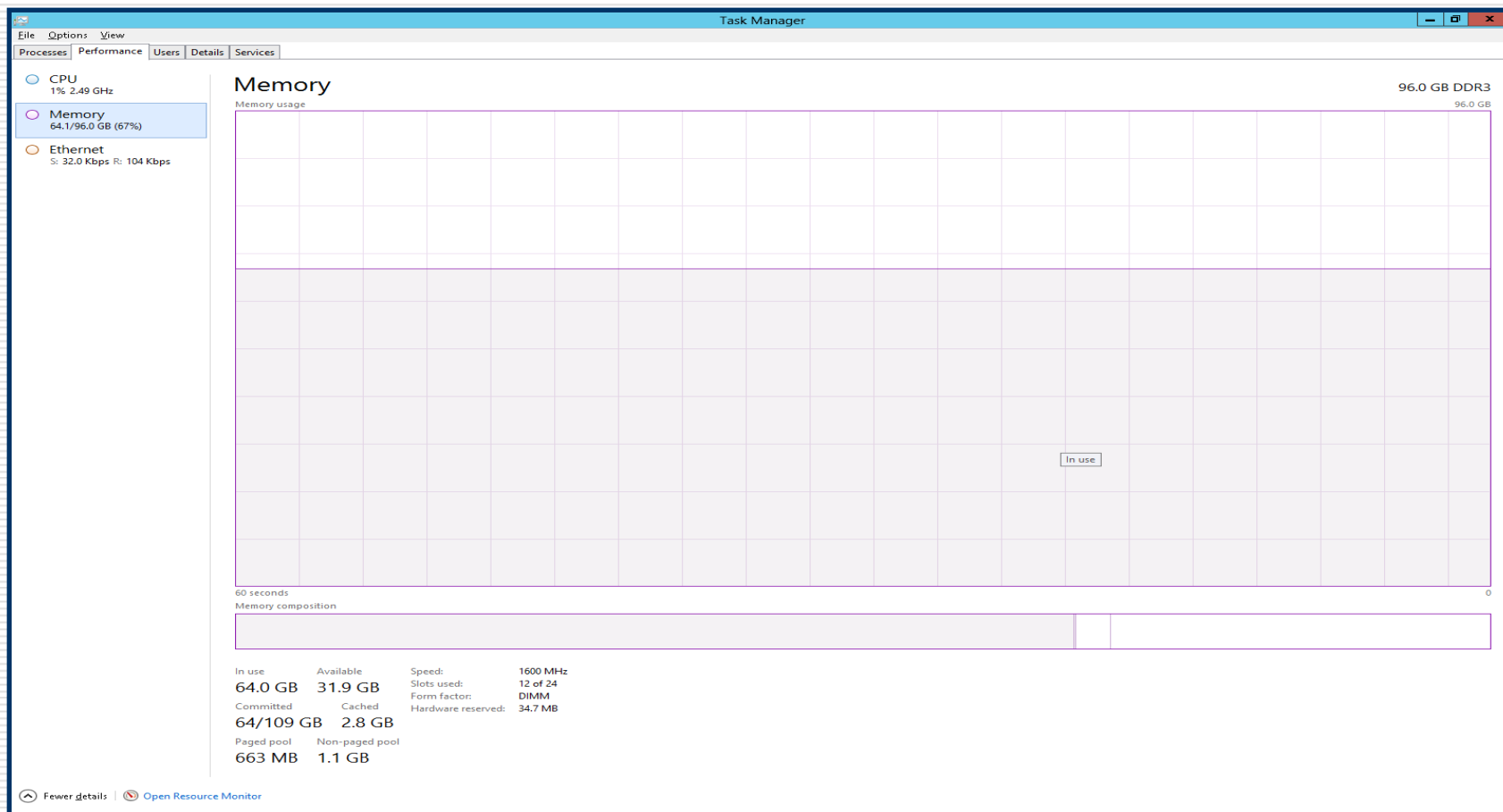
# Opterećenje virtualnog noda - iAS



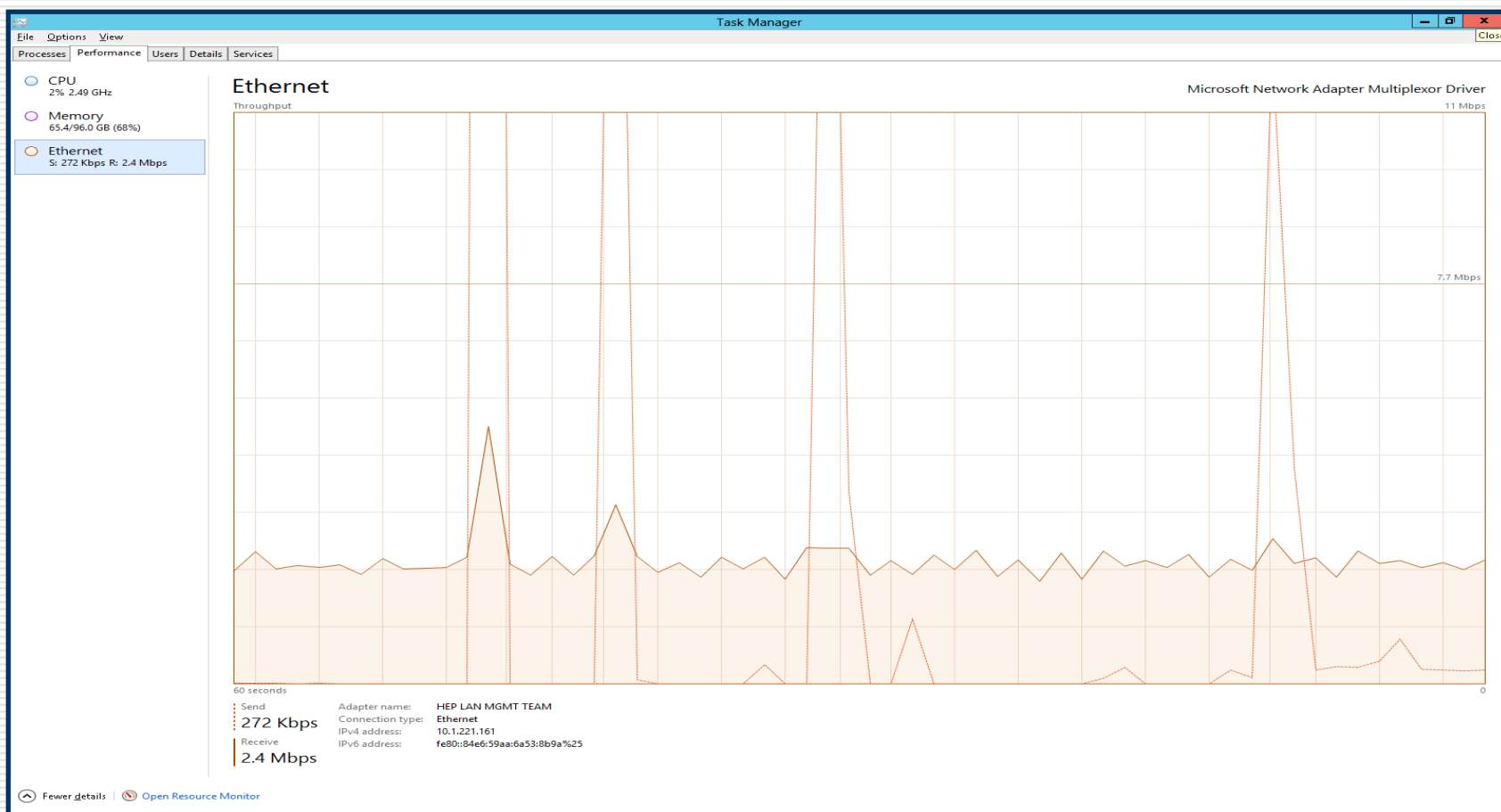
# Opterećenje Hyper-V platforme - CPU



# Opterećenje Hyper-V platforme - RAM

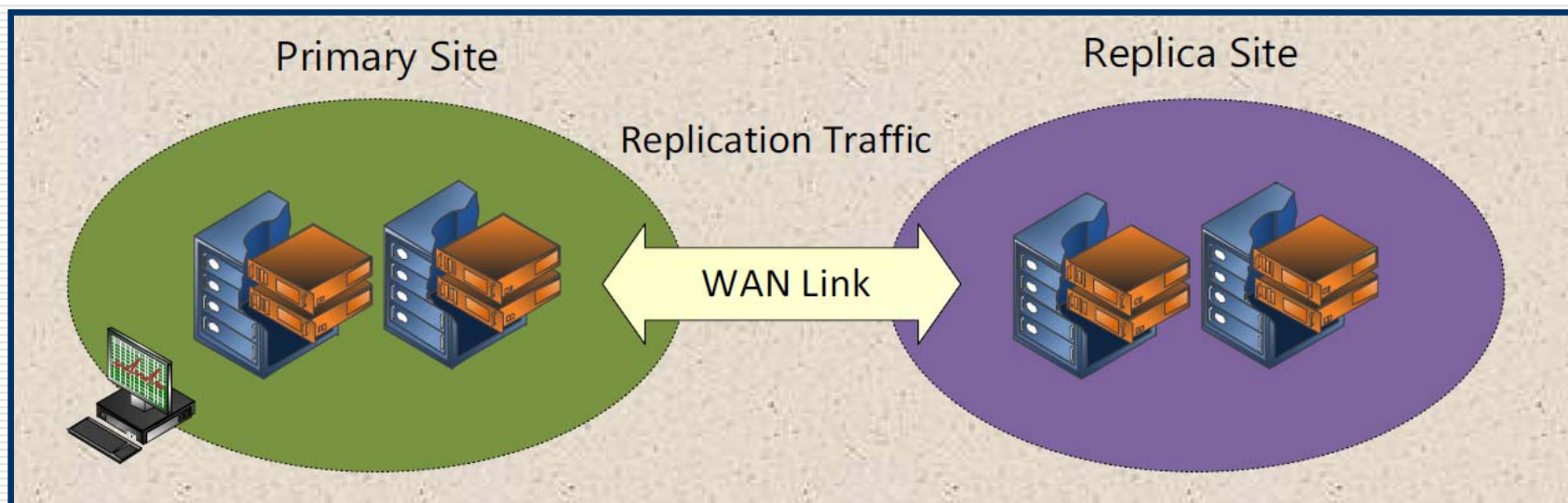


# Opterećenje Hyper-V platforme - Ethernet



# Disaster Recovery (DR) rješenje

- Primary site - Zagreb - 2 servera: HA
- Replica site - Split - 1 server



# Disaster Recovery (DR) rješenje

## Hardware na sekundarnoj lokaciji Split

---

- Server
  - SST01HVIAS01
  - HP Proliant DL380G7
- CPU
  - 2 x Intel Xeon 6 jezgri
- RAM
  - 48 GB
- Diskovi
  - 6x600 GB
  - 3x146 GB
- 6 mrežnih 1 Gbit Ethernet kartica



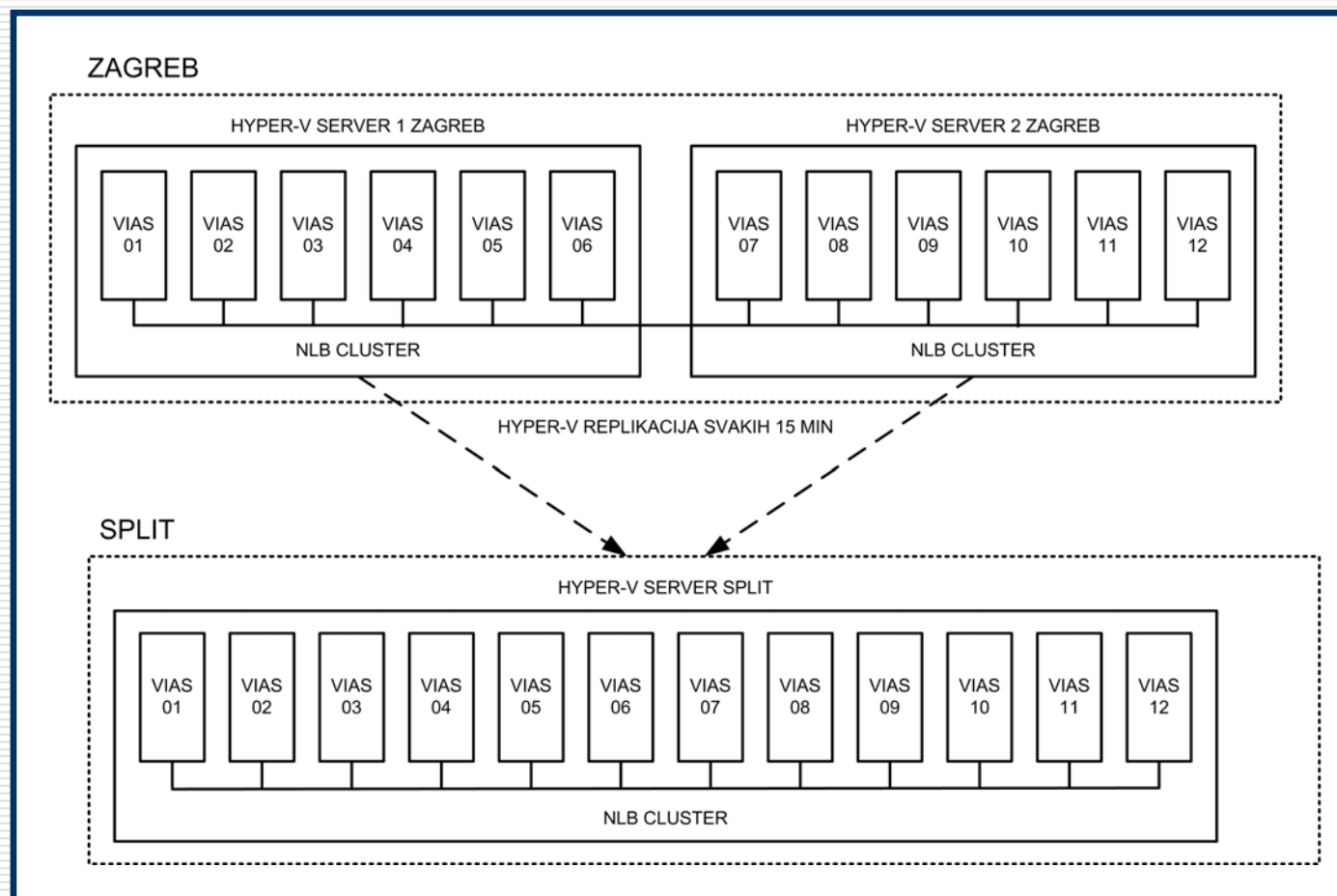
# Disaster Recovery (DR) rješenje

- ❑ Replicira svih dvanaest virtualnih servera na jednu Hyper-V platformu u Splitu
  - svakih 15 minuta
  - VM u Splitu spuštene (Off)
- ❑ U slučaju potrebe cijeli NLB cluster iAS-a radio bi iz lokacije Split sa nešto nižom performansom
- ❑ Ručna intervencija u Splitu – podizanje VM

Replication Type:	Primary	Current Primary Server:	SZG01HVIAS01.data.centar
Replication State:	Replication enabled	Current Replica Server:	sst01hvias01.data.centar
Replication Health:	Normal	Last synchronized at:	10/3/2014 3:40:53 PM

Summary | Memory | Networking | Replication

# Disaster Recovery (DR) rješenje





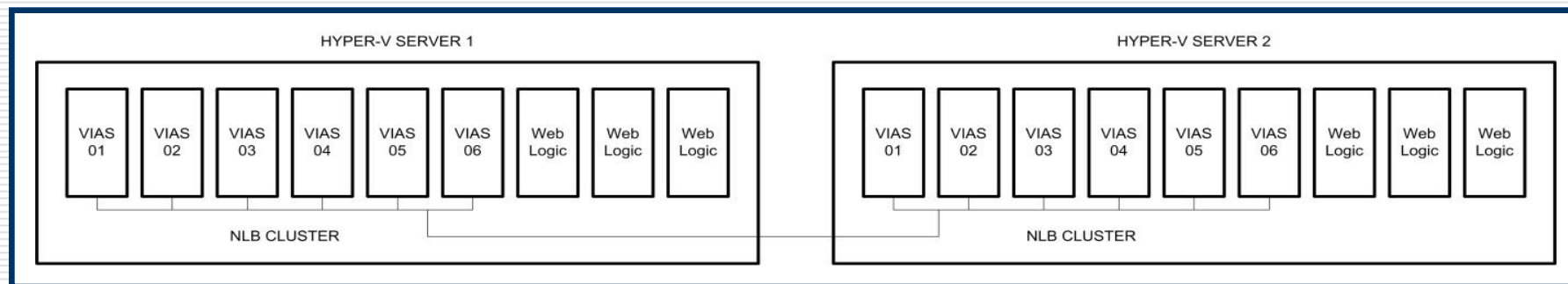
## Disaster Recovery (DR) rješenje

---

- ❑ Drugi IP adresni range u Splitu
  - Hyper-V replike s uključenom alternate IP address
- ❑ Zagreb
  - IP adrese 10.1.200.53-10.1.200.204
- ❑ Split
  - IP adrese u rangu 10.129.64.44-10.129.64.49 za replike novih virtualnih strojeva na Hyper-V platformi u SIT Split
- ❑ Nakon podizanja VM na Hyper-V platformi u Splitu potrebna ručna izmjena adrese clustera u DNS-u HEP-a

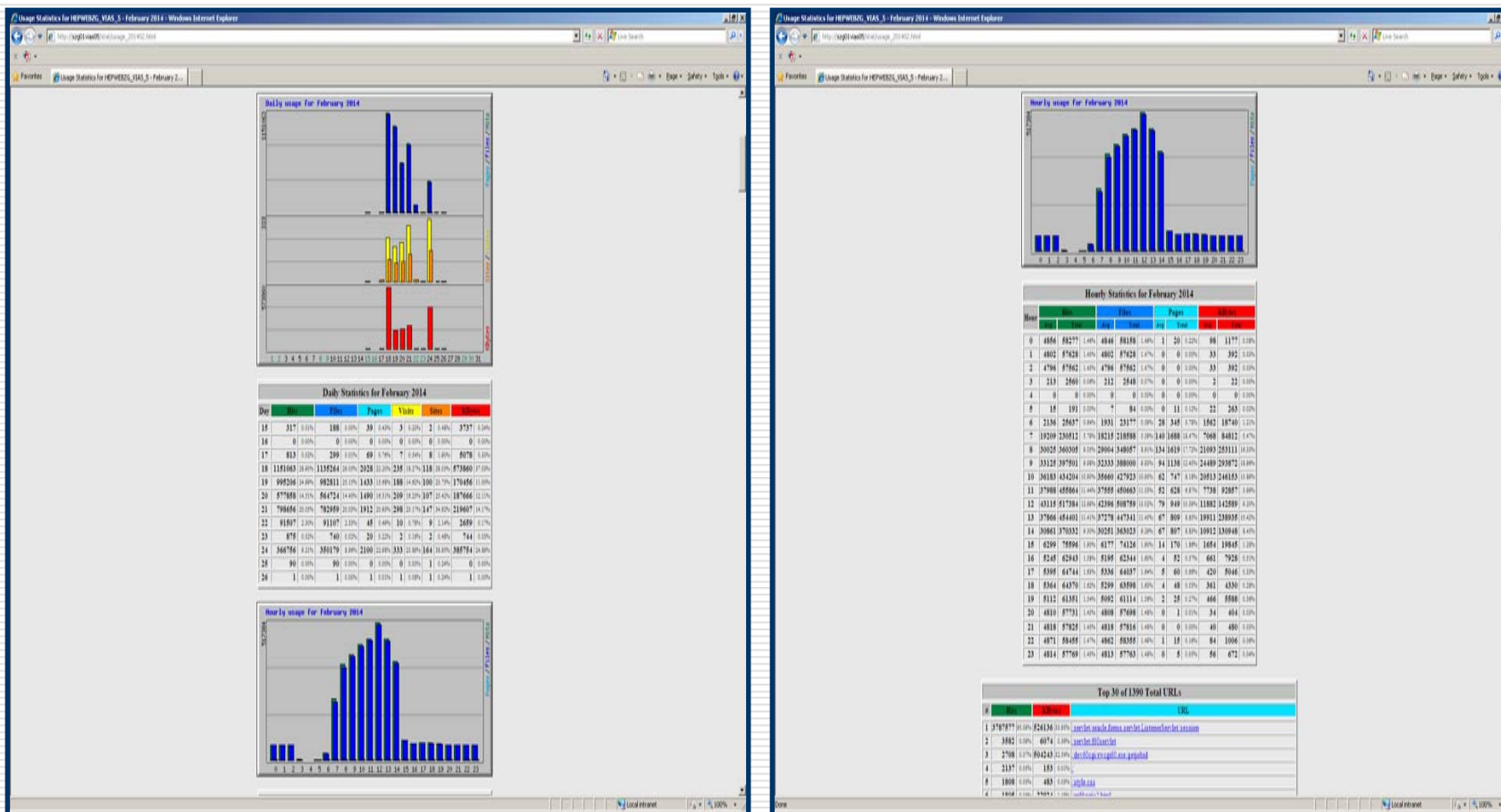
# Ostali aplikacijski serveri instalirani na Hyper-V platformama

- Da bi se maksimalno iskoristile prednosti Oracle per CPU licenciranje
  - Tri dodatna WebLogic servera na svakoj Hyper-V platformi



# Statistika uporabe – Webalizer

## Potrebna integracija logova sa svih nodova



# Replikacija i update aplikacija

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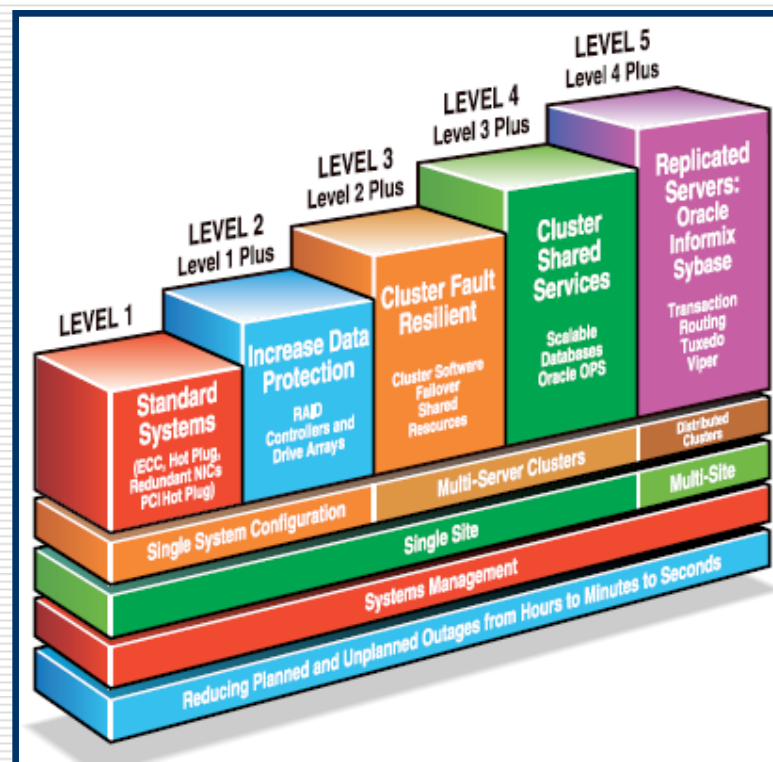
- Replikacija na sve nodove clustera
  - Dvorazinsko: Hyper-V platforma > VM na platformi
  - Kopiranje unutar 2 minute
- Update koda zajedničkih aplikacija
  - Forms - \*.fmx
  - Menus - \*.mmx
  - Reports - \*.rep
  - Tijekom noći - vrlo mali broj ili bez korisnika
- Kill svih ifweb60.exe na svim nodovima
  - ifweb60 proces "drži" formu (lock)
- Lock riješeno na verzijama 10g+, ali
  - Neučinkovito koristi RAM
  - Stoga nije pogodno za produkciju (samo razvoj)

# Raspoloživost

## Hyper-V NLB cluster

## Geografski disperzirani cluster

Raspoloživost	Godišnje vrijeme van pogona*
99%	87.6 sati
99.9%	8.76 sati
99.99%	52.5 minuta
99.999%	5.25 minuta



\*Kvarovi i planirano održavanje

# Airbus A320

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# Cessna 172

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# Primjer usporedbe dva tehnička sustava s različitom konstrukcijom, redundancijom i mogućnostima

- Da li je A320 siguran?
  - Accident rate 0.08/1.000.000 flights
- Da li je Cessna 172 sigurna?
  - Accident rate 5/1.000.000 flight hours
- Airbus A320 oko 50 puta sigurniji od Cessne 172
- Na malom uzorku nema razlike
  - Kroz kraći period oba zrakoplova funkcioniraju podjednako pouzdano
- Na velikom uzorku razlika je ogromna
  - Dulji period i velika flota



# Iskustva

---

- Da li je cluster iAS-a na Hyper-V instaliran na samo dva fizička servera pouzdan kao geografski disperzirani cluster?
  - Sigurno ne!
  - Geografski disperzirani cluster ima raspoloživost i do 99.999% (**overkill???**)
- Da li zadovoljava trenutno stanje
  - Da, pogotovo ako smo zadovoljni s raspoloživosti reda 99.9%
- Da li se ruši?
  - Zasad ne!
  - Poneki otkaz Hyper-V management konzole

# Iskustva

---

- Hyper-V umjesto geografski disperziranog clustera?
  - Zanimljivo za male i srednje poslovne sustave gdje je potreban veliki kapacitet
  - Nema dovoljno resursa za izgradnju geografski disperziranog clustera (npr. bez regionalnih centara)
- Štednja na licencama?
  - Zanimljivo opet za male i srednje poslovne sustave
  - Manje smisla u velikim poslovnim sustavima (zanemariva relativna ušteda u usporedbi s velikim drugim troškovima)
- Centralizacija sustava
  - U realnost i centralizirana administracija

# Zaključak

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- ❑ Pogodno za visok kapacitet
  - Tisuće istovremenih korisnika
- ❑ Pogodno za manje i srednje velike poslovne sustave bez više regionalnih centara
- ❑ Per CPU Oracle licenciranje
  - Troškovi licenciranja su stvarno niži
- ❑ Malo manje pogodno za visoku raspoloživost
  - No free lunch – jeftinije licenciranje, niža raspoloživost
  - Raspoloživost još uvijek dovoljna za većinu namjena, reda 99.9% (mogući ispadi reda nekoliko sati godišnje)
  - Ipak otprilike 10-100 puta manja raspoloživost od geografski disperziranog clustera (99.99% – 99.999%)

# HVALA NA PAŽNJI!

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