



## Vježba 3. SQL AlwaysOn Failover Clustering

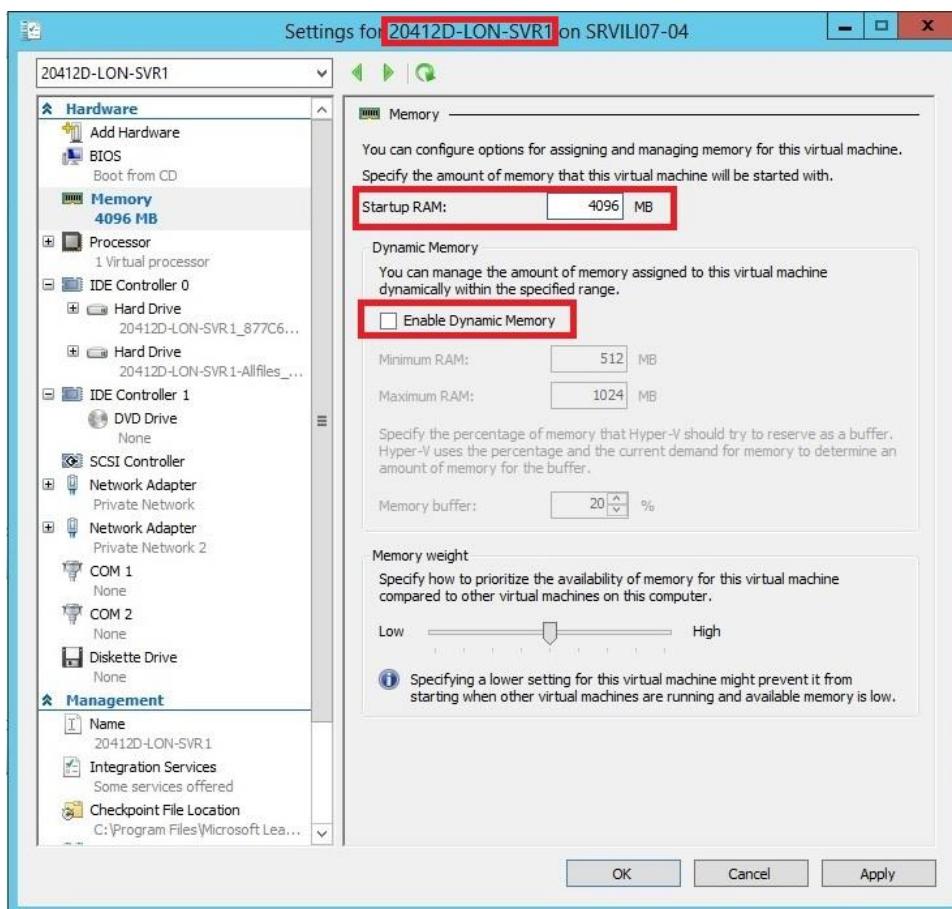
Za potrebe ove laboratorijske vježbe, instalirati ćemo AlwaysOn Failover cluster koristeći Microsoft SQL Server 2014. Za potrebe vježbe trebati će nam:

- virtualne mašine 20412D-LON-DC1, 20412D-LON-SVR1, 20412D-SVR3
- ISO datoteka sa instalacijom Windows Server 2012 R2 operacijskog sustava
- ISO datoteka sa instalacijom Microsoft SQL Server 2014
- virtualnu mašinu 20412D-LON-DC1 možemo pokrenuti odmah, a SVR1 i SVR3 ćemo pokrenuti nakon pripremnih radnji koje su opisane ispod.

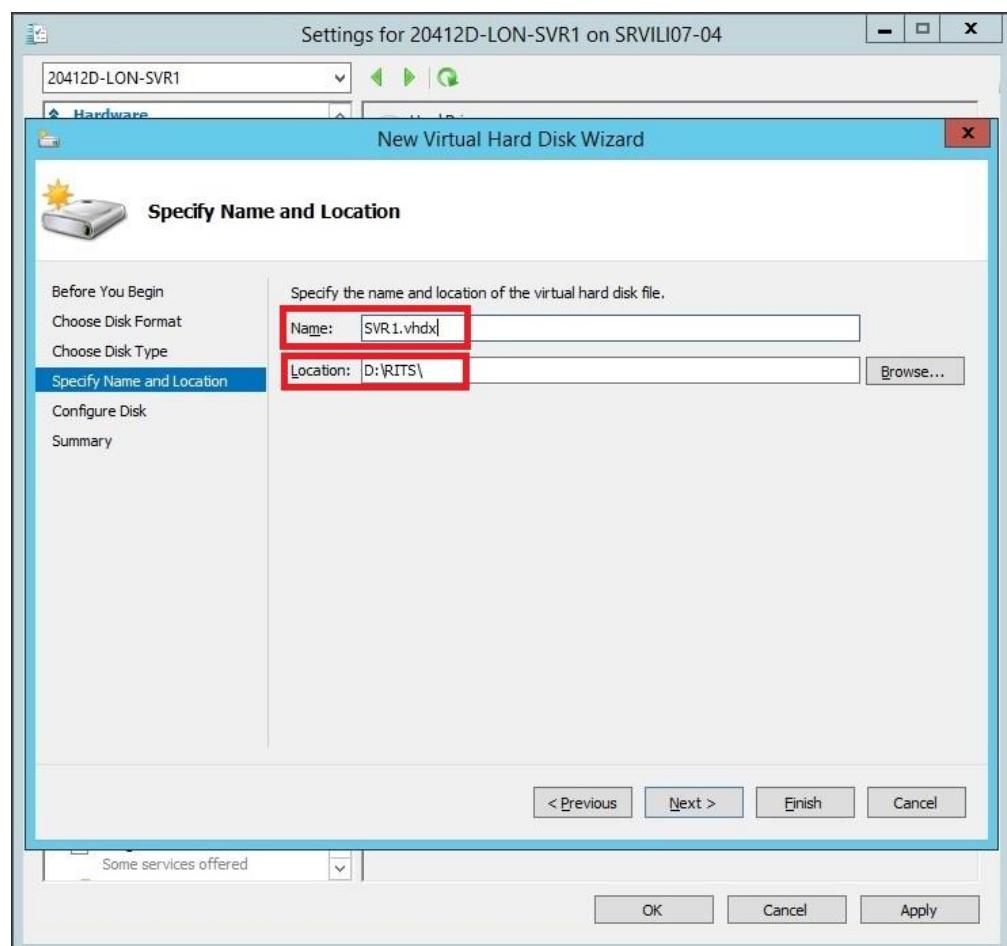
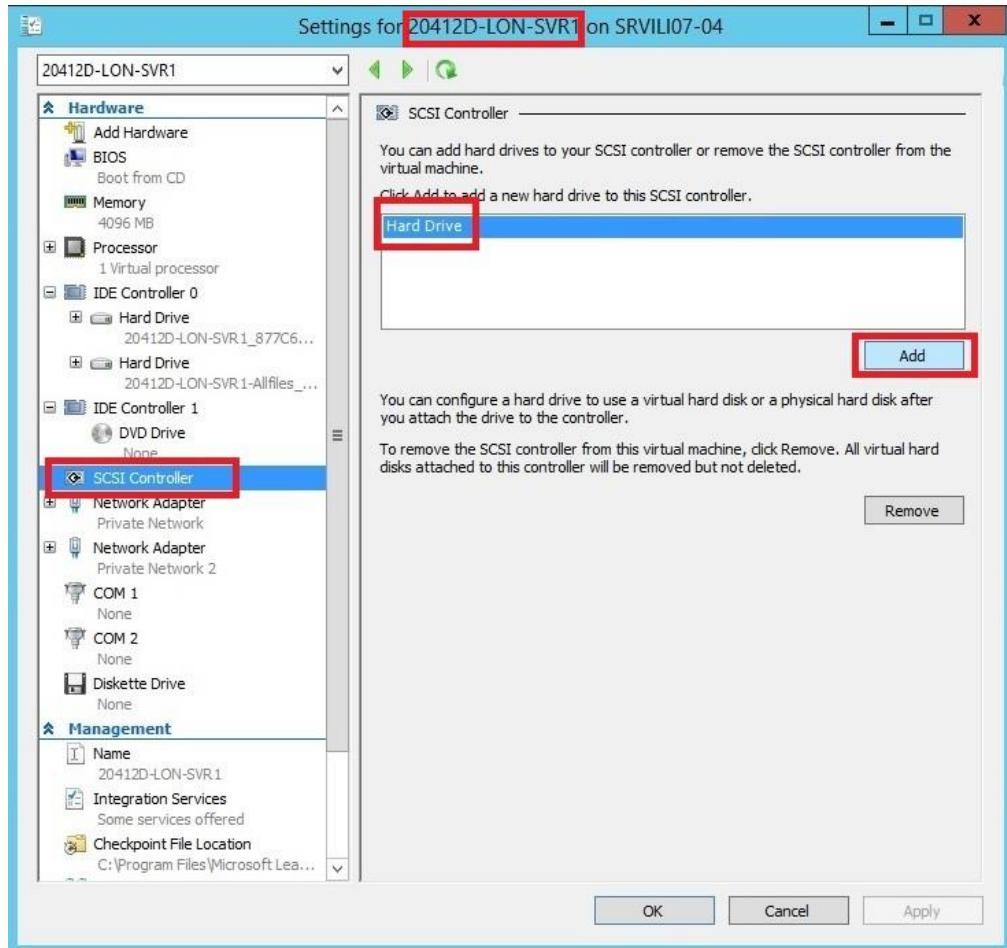
## Priprema prije paljenja virtualnih mašina SVR1 i SVR3:

Potrebno je napraviti nekoliko izmjena na navedenim virtualnim mašinama, pa ćemo prvo napraviti sve potrebne izmjene.

1. Na virtualnim mašinama 20412D-LON-SVR1 i 20412D-LON-SVR3 potrebno je napraviti rekonfiguraciju:
  - ugasiti Dynamic Memory
  - umjesto postojećih 1024MB memorije dodati fiksnih 4096MB memorije



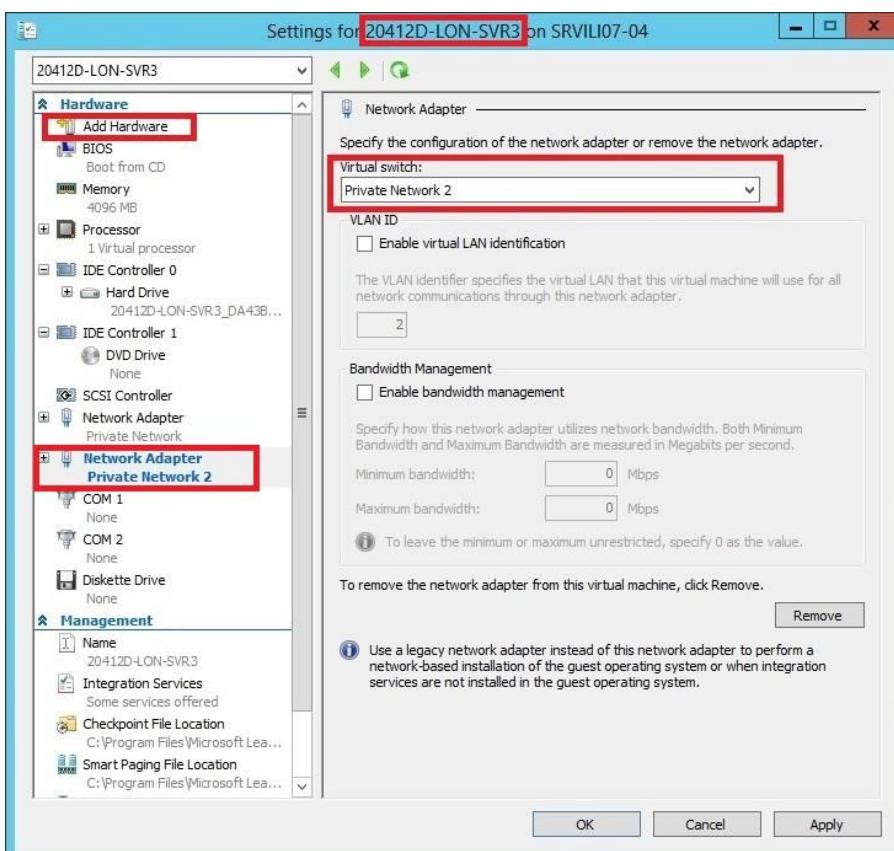
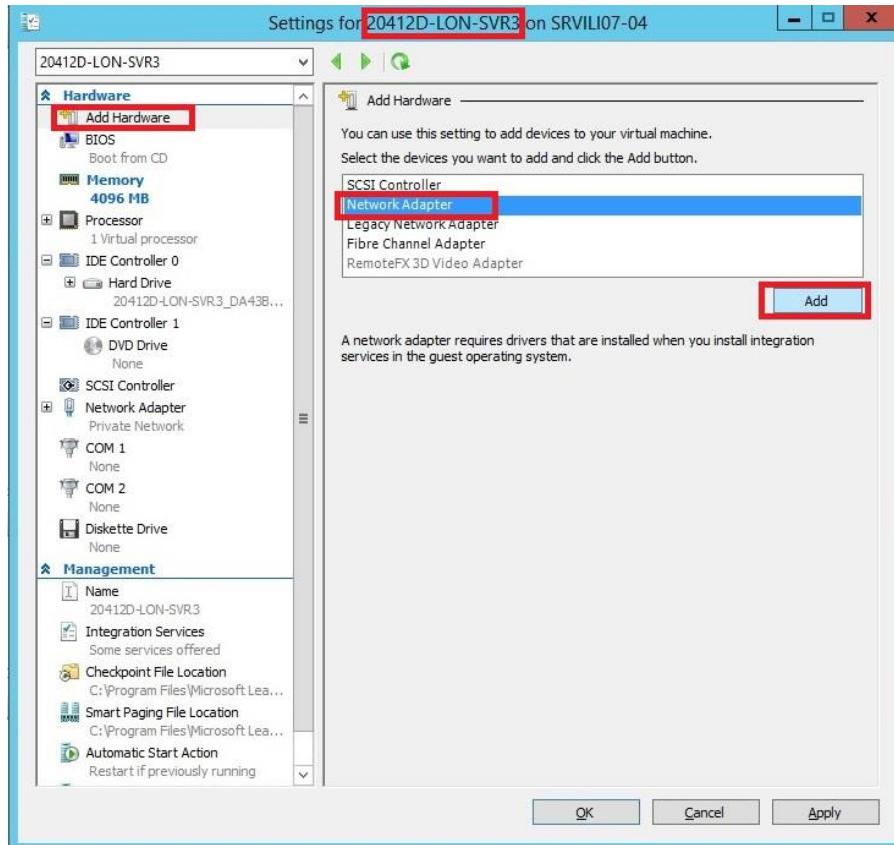
- dodati još jedan virtualni disk - na SCSI kontroler, smjestiti ga na D: disk u novokreirani direktorij RITS - fixed disk veličine 10GB (ne Differencing, niti Dynamically Expanding!), datoteka neka se zove SVR1.vhdx. Ako direktorij RITS na D disku ne postoji, napravite ga unaprijed.



**Istu stvar potrebno je napraviti i na virtualnoj mašini SVR3, samo neka se datoteka zove SVR3.vhdx.**

2. Na mašini 20412-LON-SVR3 potrebno je napraviti dodatnu konfiguraciju:

- potrebno je dodati još jednu mrežnu karticu koja će biti spojena na Private Network 2 Hyper-V virtualni switch





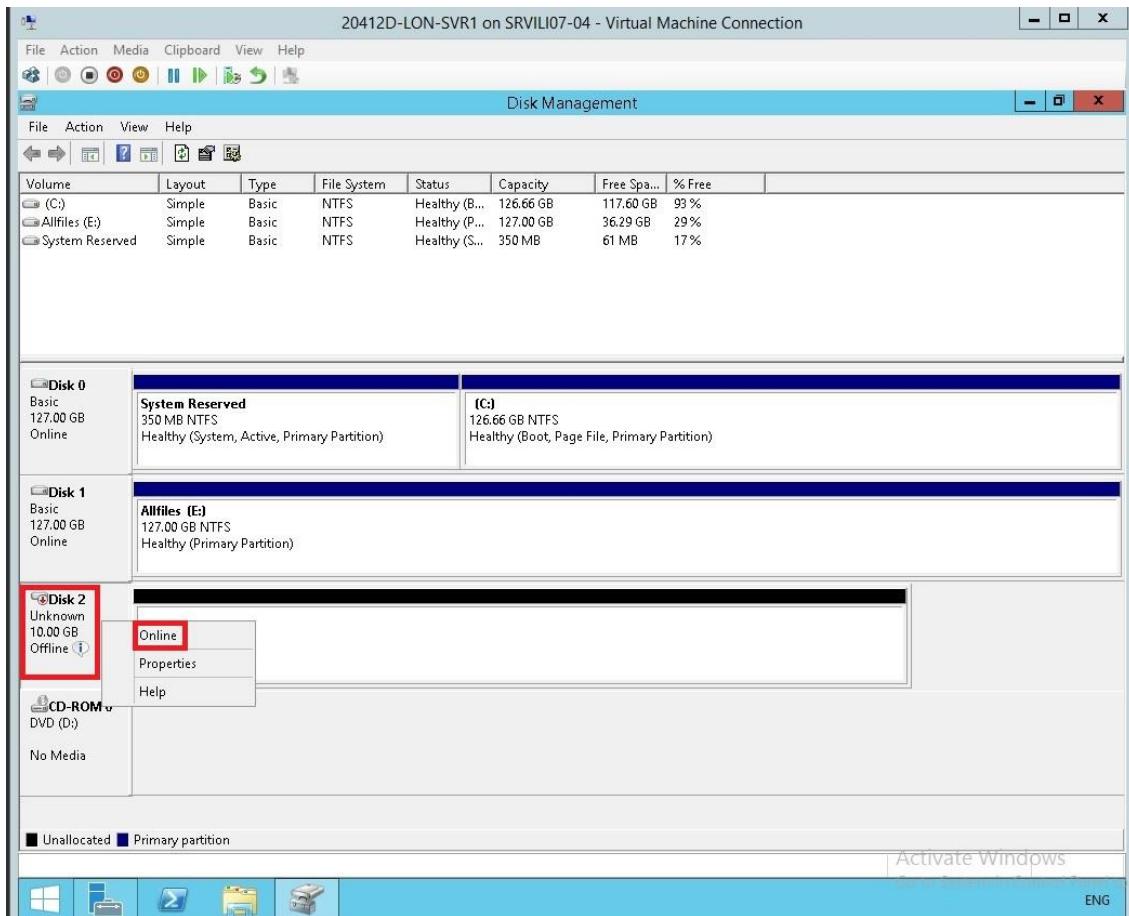
Time smo završili konfiguraciju SVR1 i SVR3 virtualnih mašina i možemo ih sada pokrenuti. Pričekajte 3-4 minute dok se virtualke upale kako biste sa njima mogli raditi. Za to vrijeme ulogirajte se u DC1 virtualku i isključite firewall u svim profilima (koristite Windows Firewall with Advanced Security konzolu). Istu akciju napravite i na SVR1 i SVR3 virtualkama kada se upale. Također, pošto smo u virtualnu mašinu SVR3 dodali još jednu mrežnu karticu, moramo ju konfigurirati. Dakle, u SVR3 virtualnoj mašini na mrežnoj kartici "Ethernet 3", postavite slijedeću IP konfiguraciju:

IP adresa: 131.107.0.23

Netmask: 255.255.0.0, bez gatewaya i bez DNS adresa.

Kada ste to napravili pokušajte ping-ati 131.107.0.21. Trebali biste dobiti odgovor od virtualne mašine SVR1. Ako vam se nakon gašenja firewalla i konfiguracije mreže SVR1 ne "javlja", zovite predavača.

Na virtualnoj mašini SVR1 podignite Disk Management utility (windows tipka, upišite na tipkovnici diskmgmt.msc i pritisnite Enter). Vidjeti ćete jedan disk koji će biti offline, u neinicijaliziranom stanju. To je upravo virtualni disk koji smo maloprije dodali (SVR1.vhdx, u slučaju virtualne mašine SVR1). Potrebno je disk podesiti da je online, inicijalizirati ga i formatirati ga:



Kliknite desnim gumbom miša na kvadrat oko "Disk 2" (NE se desne strane na disk koji ima crnu vrpcu sa gornje strane), i označite lijevim gumbom miša "Online". Kada to napravite, disk će biti Online, ali u neinicijaliziranom stanju. Ponovo kliknite desnim gumbom miša na kvadrat oko "Disk 2" i kliknite na "Initialize". Nakon toga, kliknite sa desne strane pored tog kvadrata (na disk sa crnom vrpcom), i pokrenite "New simple volume" wizard. Sve vrijednosti u wizardu od početka do kraja ostavite na default vrijednostima, ali provjerite da li će disk biti montiran kao F disk. Također, ukoliko želite, možete postaviti i neku labelu (tipa AlwaysOn).



Istu akciju ponovite od početka do kraja na SVR3 virtualki na Disku 1, uz napomenu da ovdje pri korištenju New simple volume wizard-a **sigurno** disk neće biti automatski podešen da se montira na F disk nego na E, pa iz menija obavezno odaberite da bude montiran kao F disk.

## Priprema instalacije Failover Clustering feature na SVR1 i SVR3

Sada su virtualke spremne za instalacije Failover Clustering feature i, nakon toga, instalaciju SQL 2014 Servera. Potrebno je u SVR1 i SVR3 virtualnim mašinama poinstalirati Failover Clustering feature. To ćemo napraviti korištenjem Windows Server 2012 R2 ISO datoteke koju ćemo montirati na DC1 virtualnu mašinu i prezentirati ju kao shared folder na DC1. Potrebno je podići Hyper-V manager, kliknuti desnim klikom miša na DC1 virtualnu mašinu, Edit settings, klik na DVD drive, browseati image koji se nalazi na E:\KZOS\Instalacije, lupiti OK. Napomena: **ne montirati SQL ISO datoteku, nego Server 2012 R2 ISO datoteku** (lako ćete prepoznati razliku po imenu datoteke). Nakon toga, u DC1 podignite Windows Explorer, desni klik na D disk i shareajte dotični direktorij sa svim korisnicima domene (označiti checkbox "Share with", klik na Advanced sharing/Share this folder, Permissions, OK, Apply, OK, close).

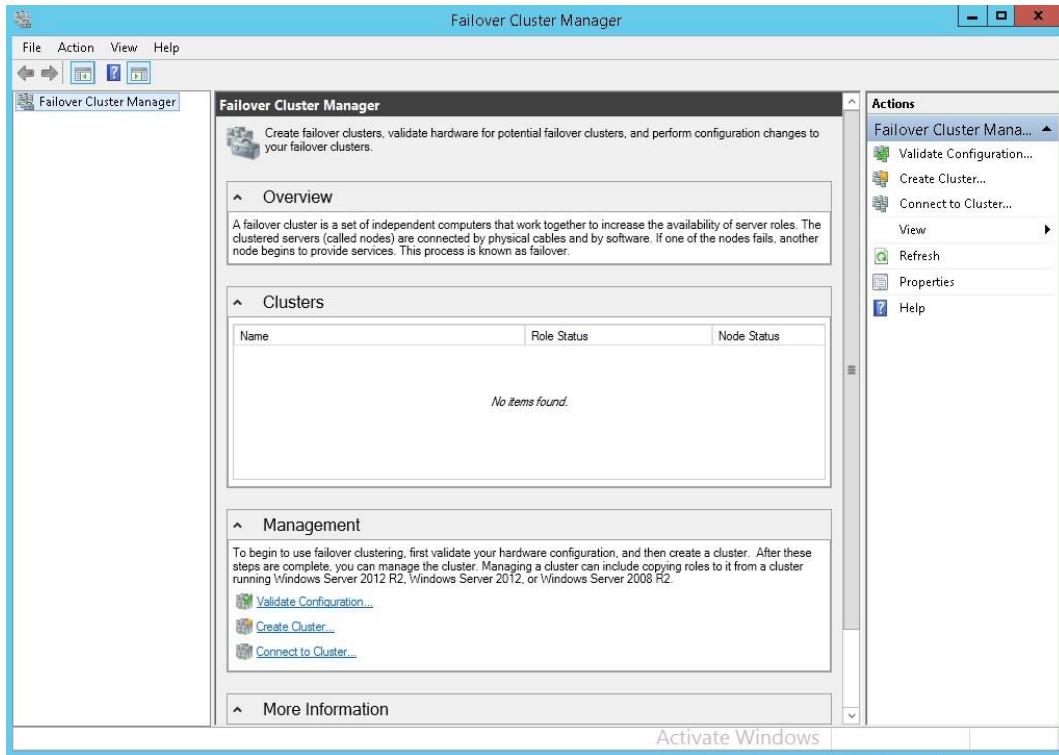
Nakon toga, na SVR1 podignite Server Manager i kroz Add roles and features wizard dodajte .NET 3.5 i Failover Clustering **feature**. U jednom trenutku za vrijeme instalacije ponuditi će vam mogućnost "Specify an alternate source path". Kliknite na taj link i na dnu ekrana upišite: \\lon-dc1\d\sources\sxs

Obavezno provjerite da li ste instalirali i .NET i Failover Clustering feature jer nam oboje trebaju za daljnju instalaciju. **Kompletну proceduru ponovite i na SVR3 virtualnoj mašini.**

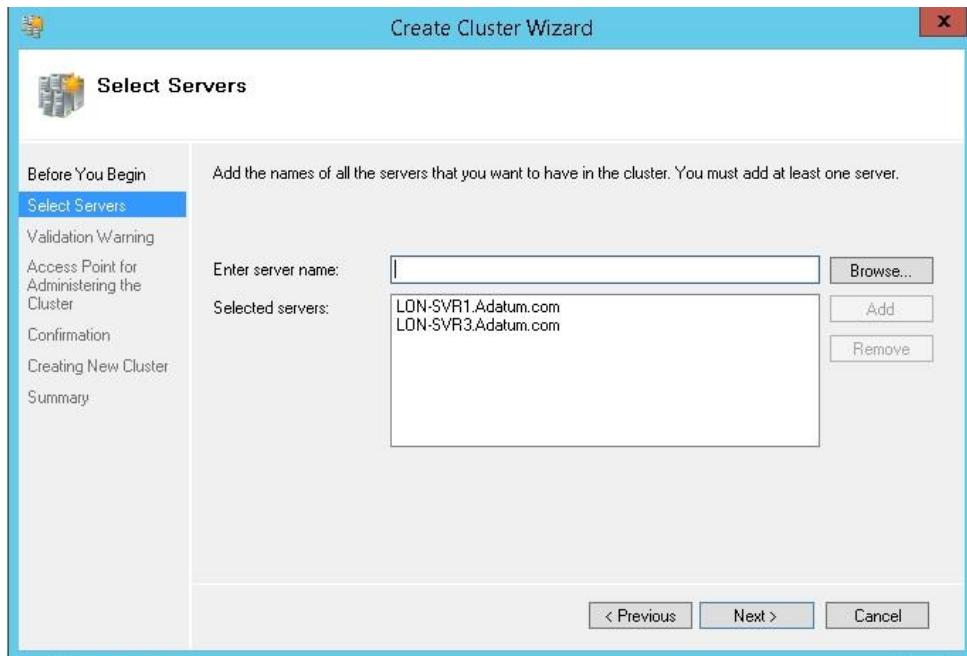
Dok traje instalacija ovih feature-a na SVR1 i SVR3, prebacite se u DC1 i napravite novi domain admin account imena SQLadmin sa lozinkom Pa\$\$w0rd. Pri kreiranju accounta maknite checkbox označku sa "User must change password at next logon" i označite "Password never expires". **Obavezno ovaj account dodajte u grupu Domain Admins.**

## Konfiguracija failover cluster feature-a, priprema za SQL

Failover cluster ćemo koristiti kao podlogu za AlwaysOn SQL cluster. Na virtualnoj mašini SVR1 podignite Failover Cluster Manager (windows tipka, krenite pisati Failover, pokazati će se ikonica od FCM-a, kliknite na nju), i klikom na "Create Cluster" napravite slijedeće:

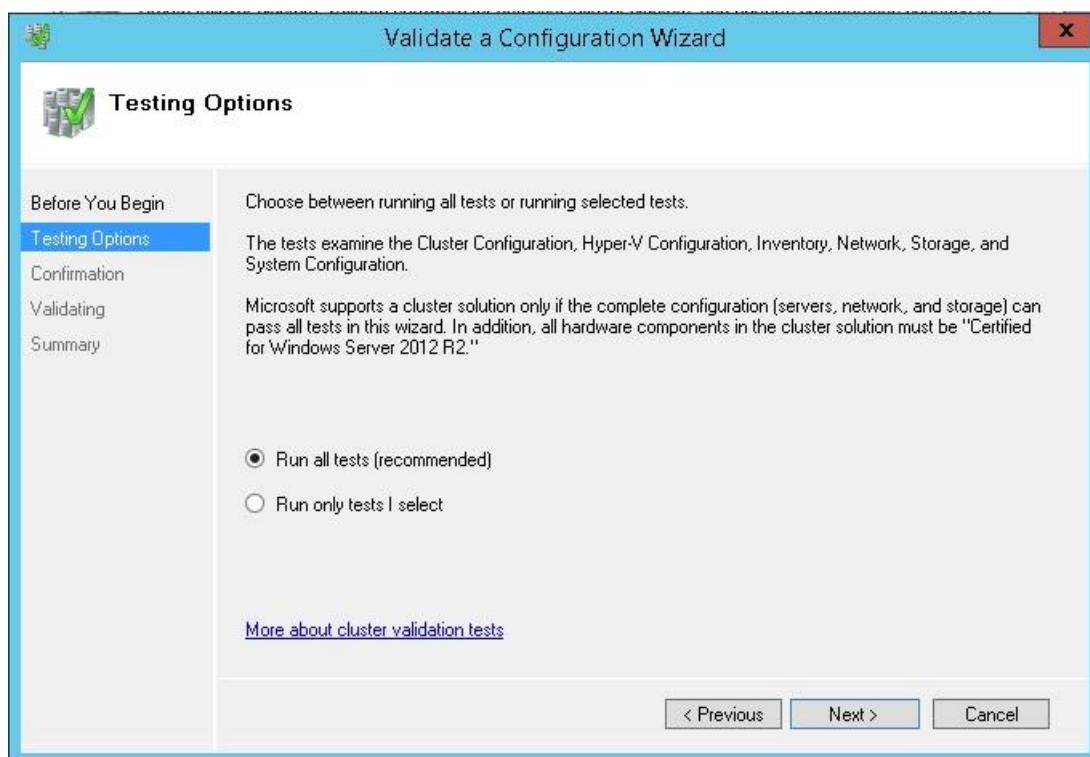
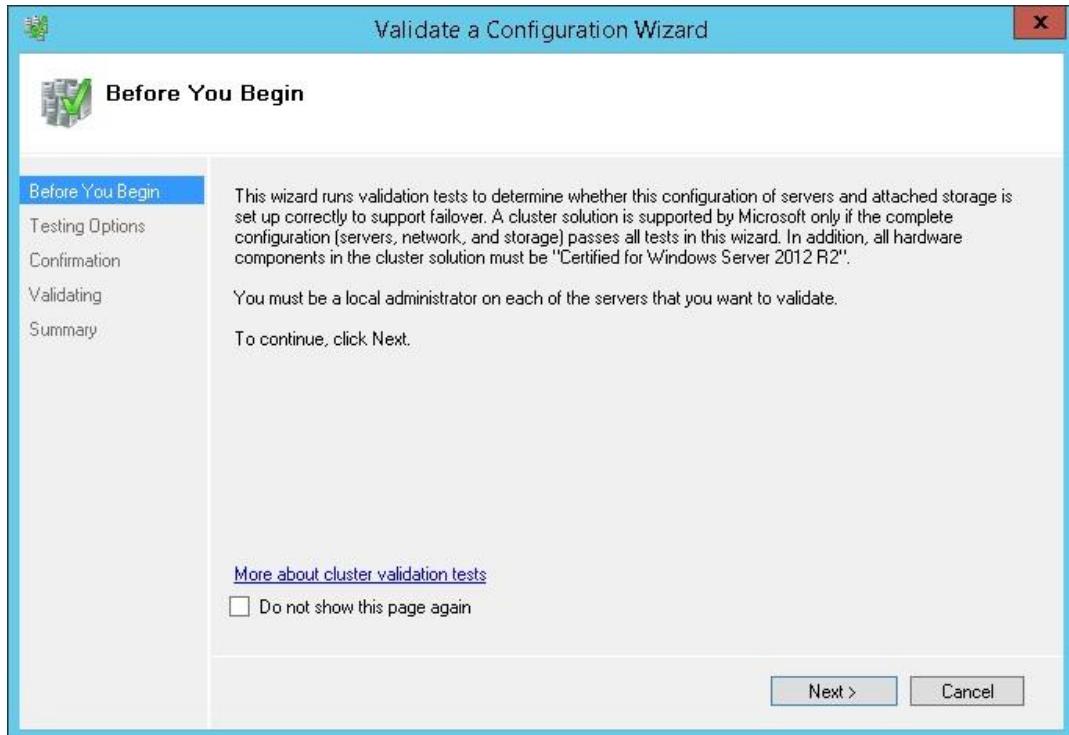


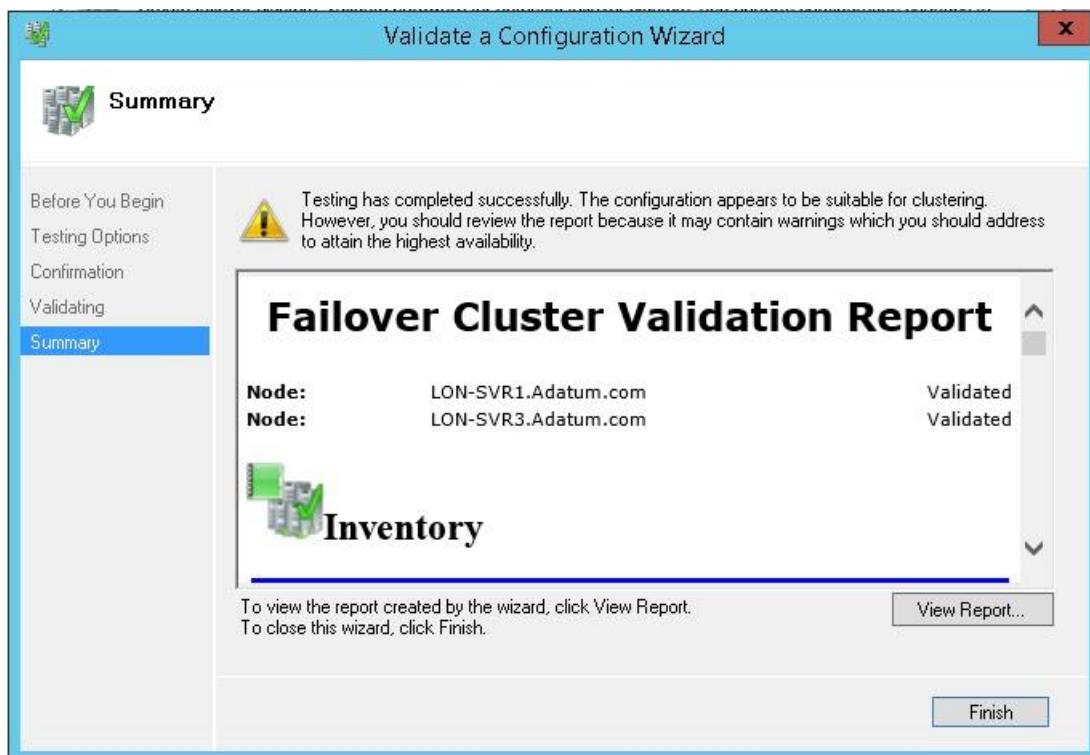
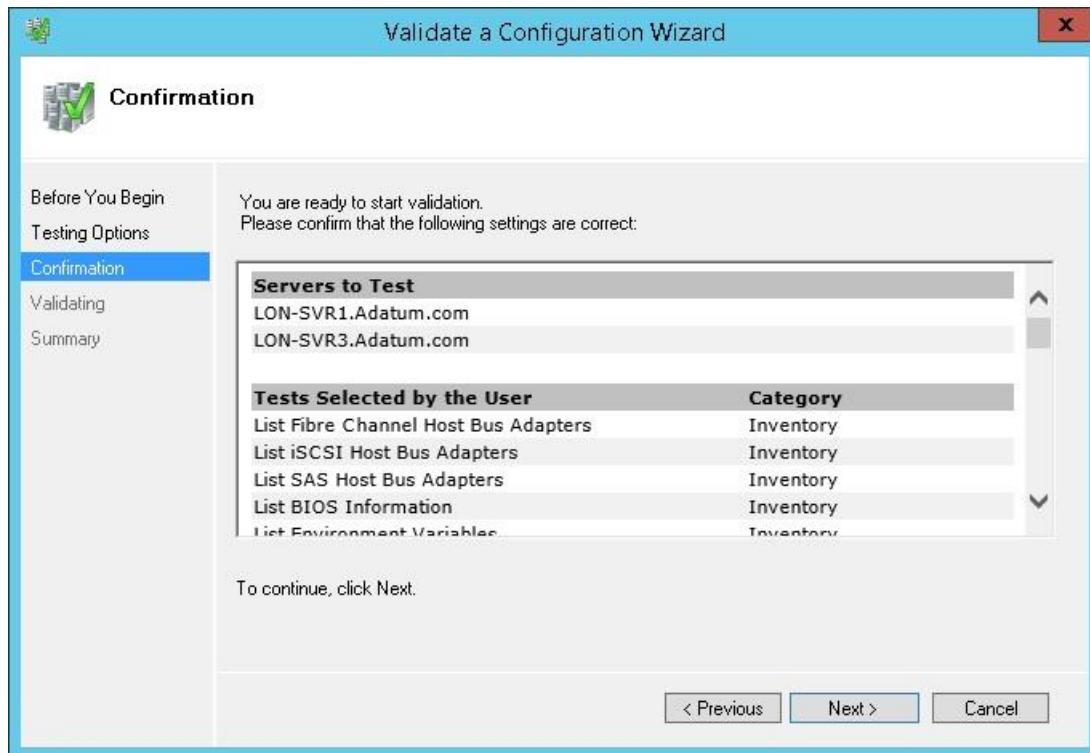
Potrebno je dodati virtualne servere koji će biti članovi clustera. Dakle, upišite LON-SVR1 i kliknite "Add", i isto to ponovite sa LON-SVR3:



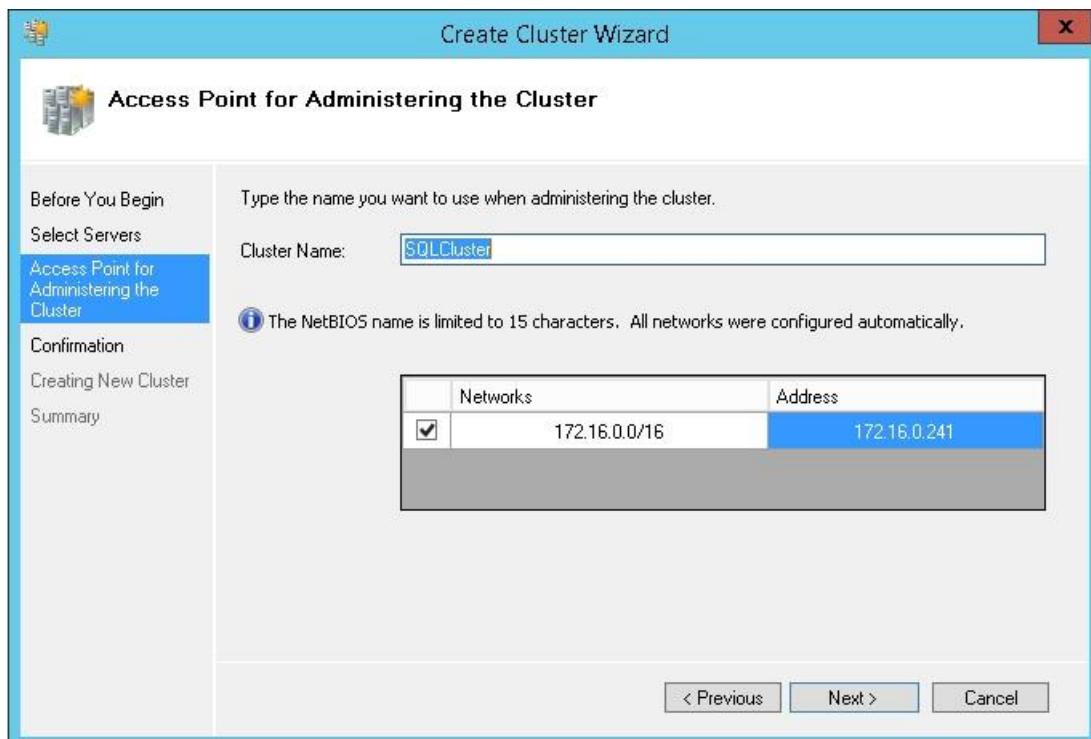
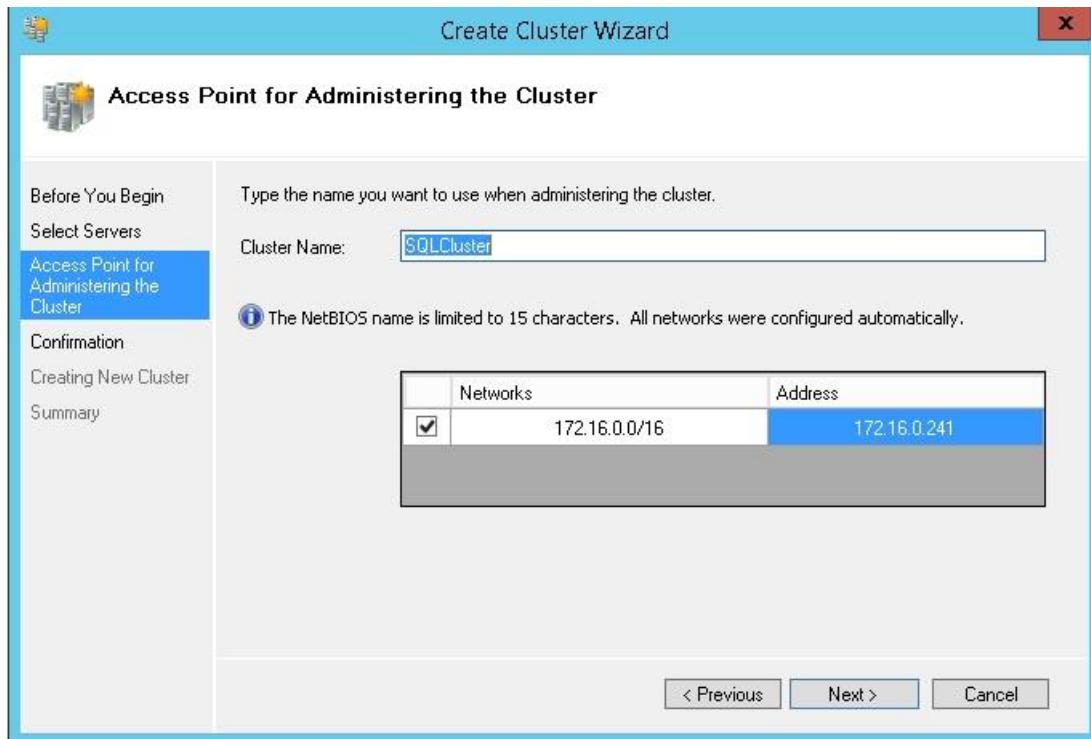
Čeka nas puno klikanja po "Next":



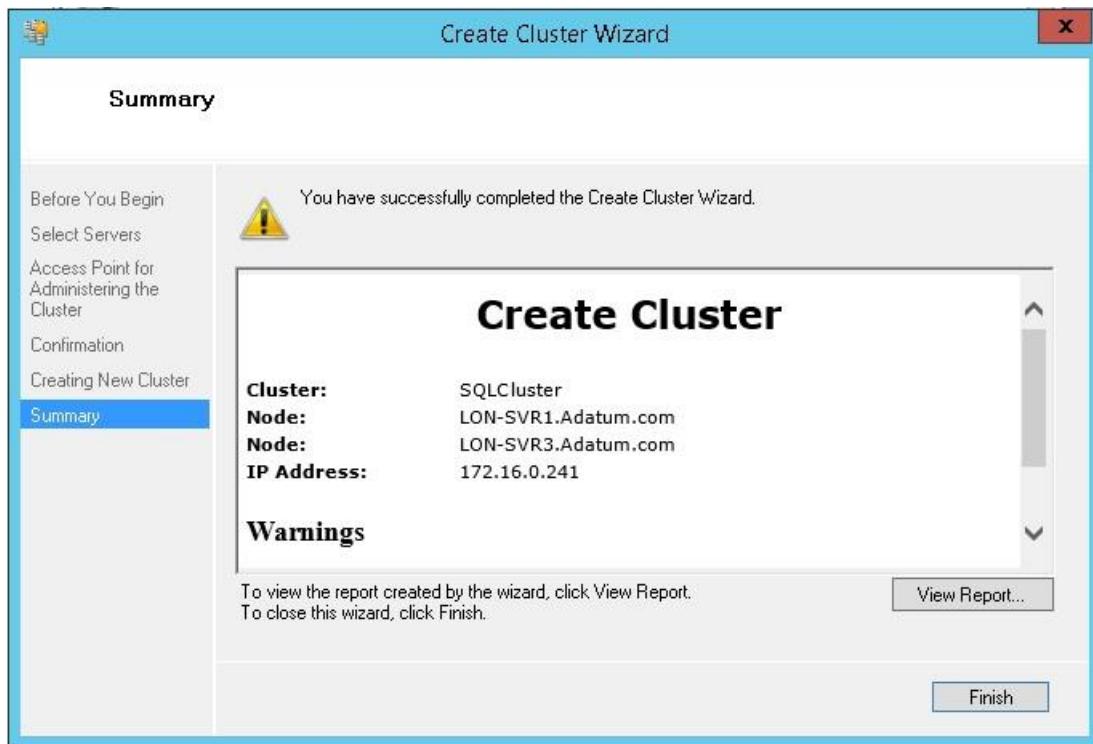




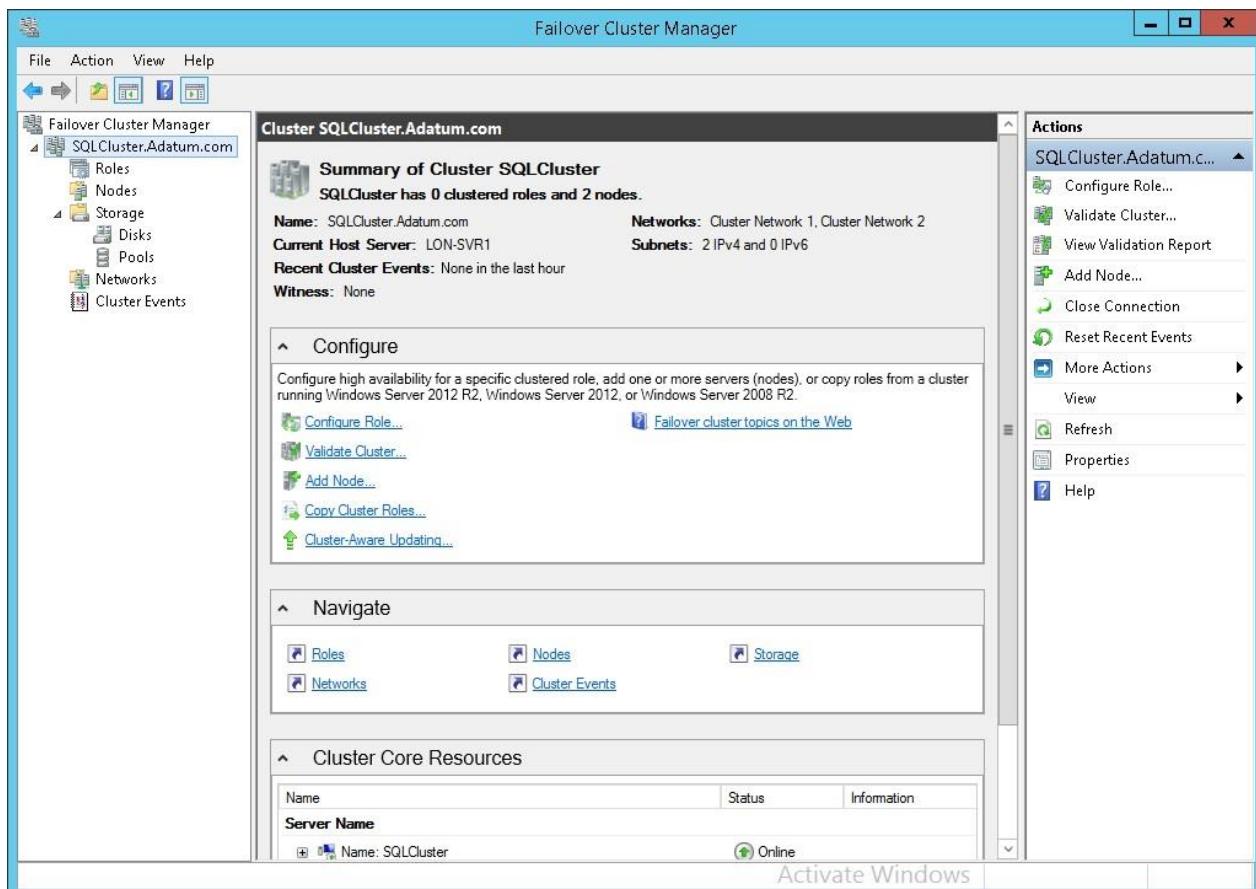
Nakon što kliknemo na "Finish", čeka nas poslijednji dio konfiguracije Failover Clustering feature-a (pokreće se automatski). Sada moramo odabrati kako će se "zvati" naš cluster objekt (Active Directory objekt), odaberimo SQLCluster, i koja će biti njegova IP adresa (odaberimo 172.16.0.241).

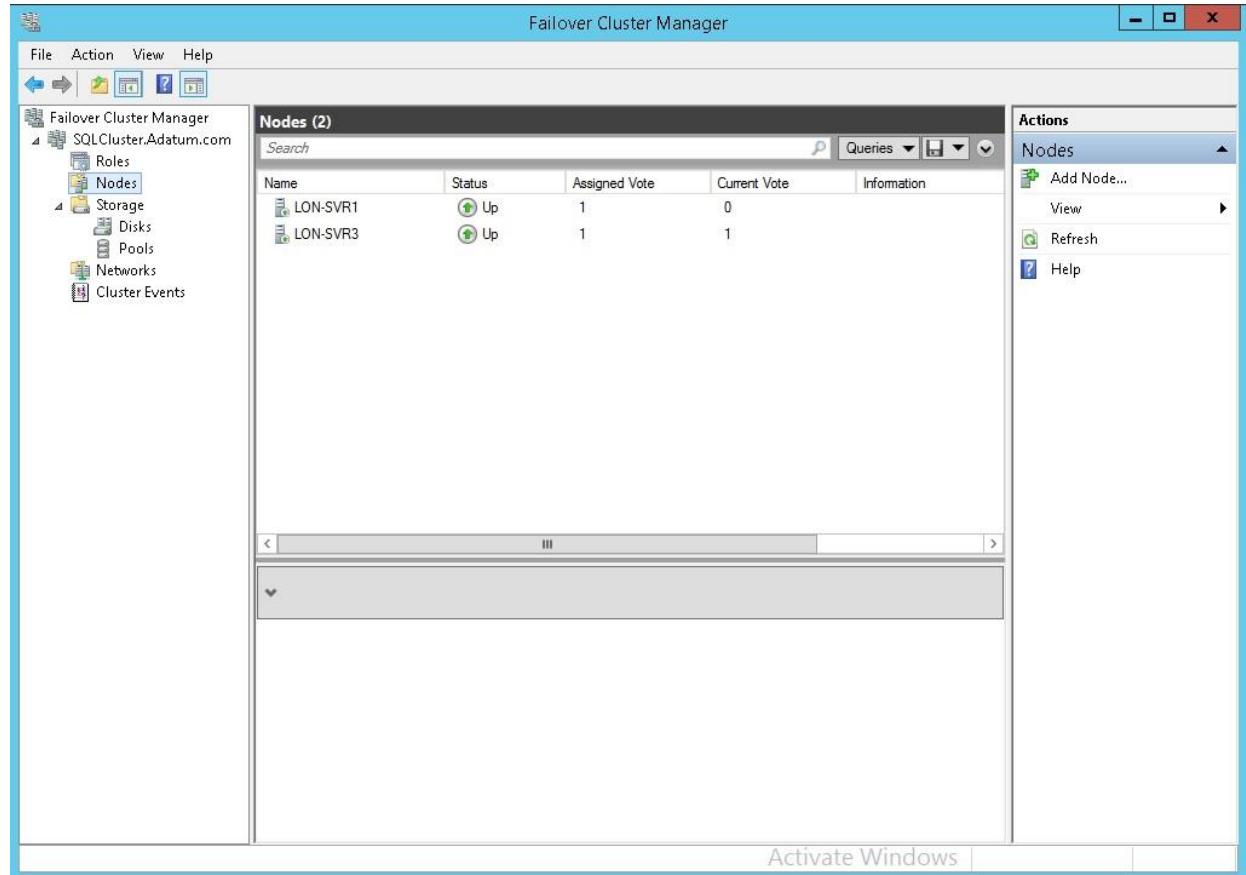
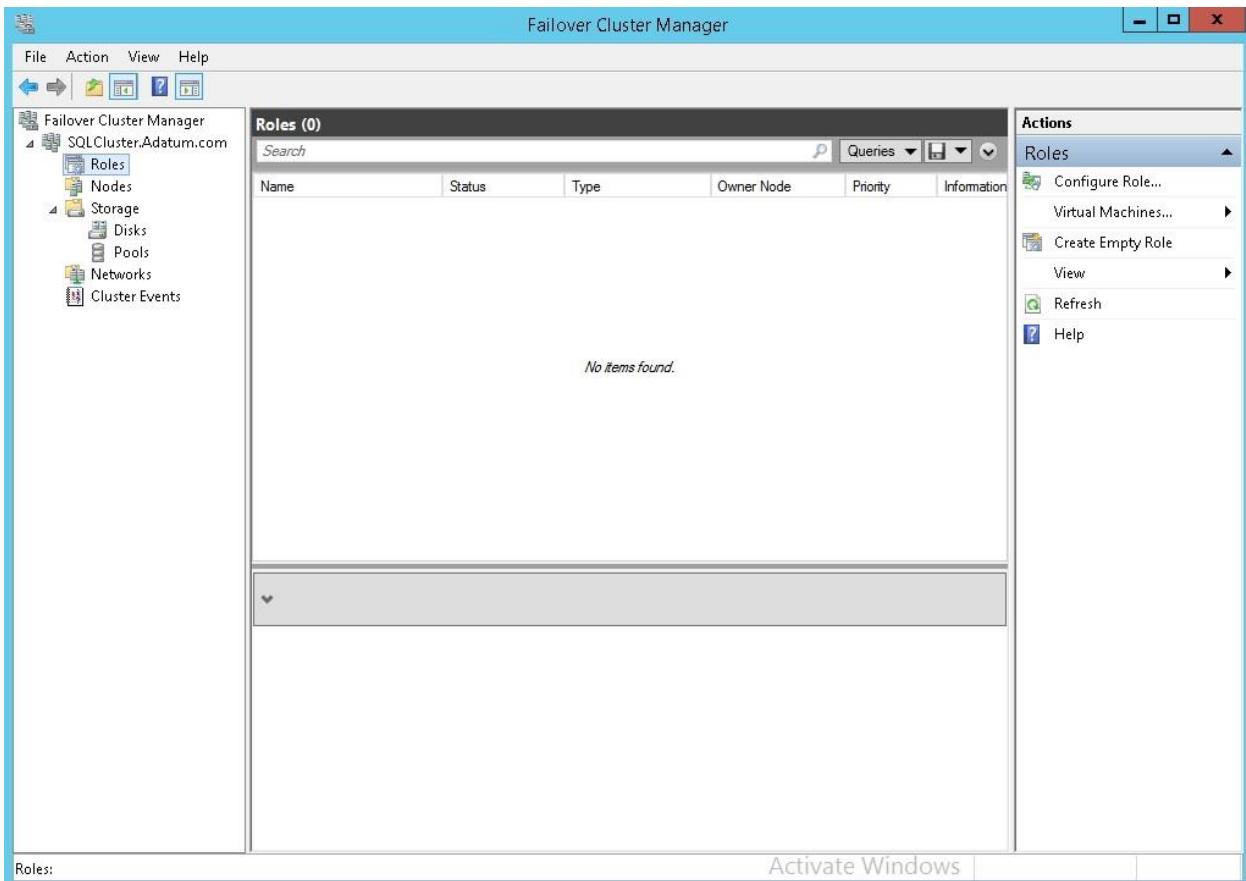


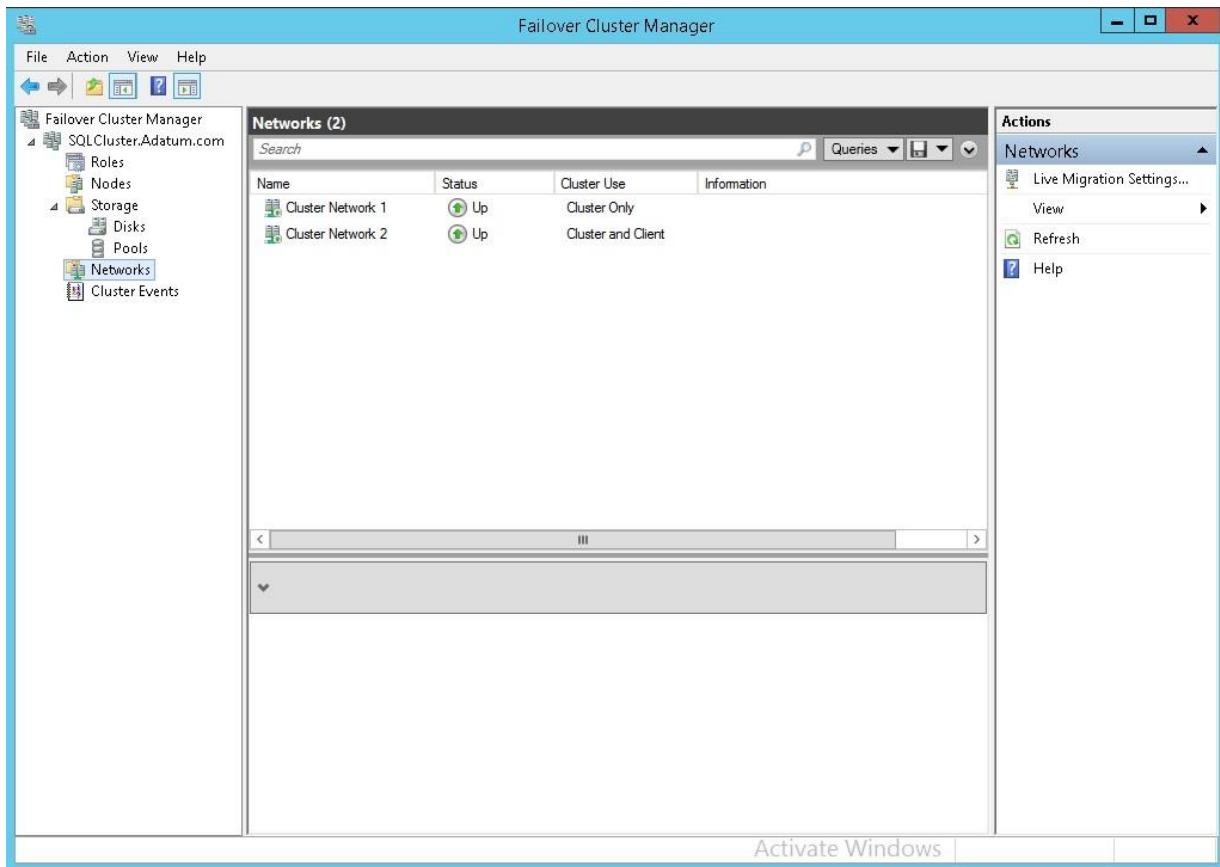
Konfiguracija Failover Clustera je sada završena, i možemo kliknuti na "Finish".



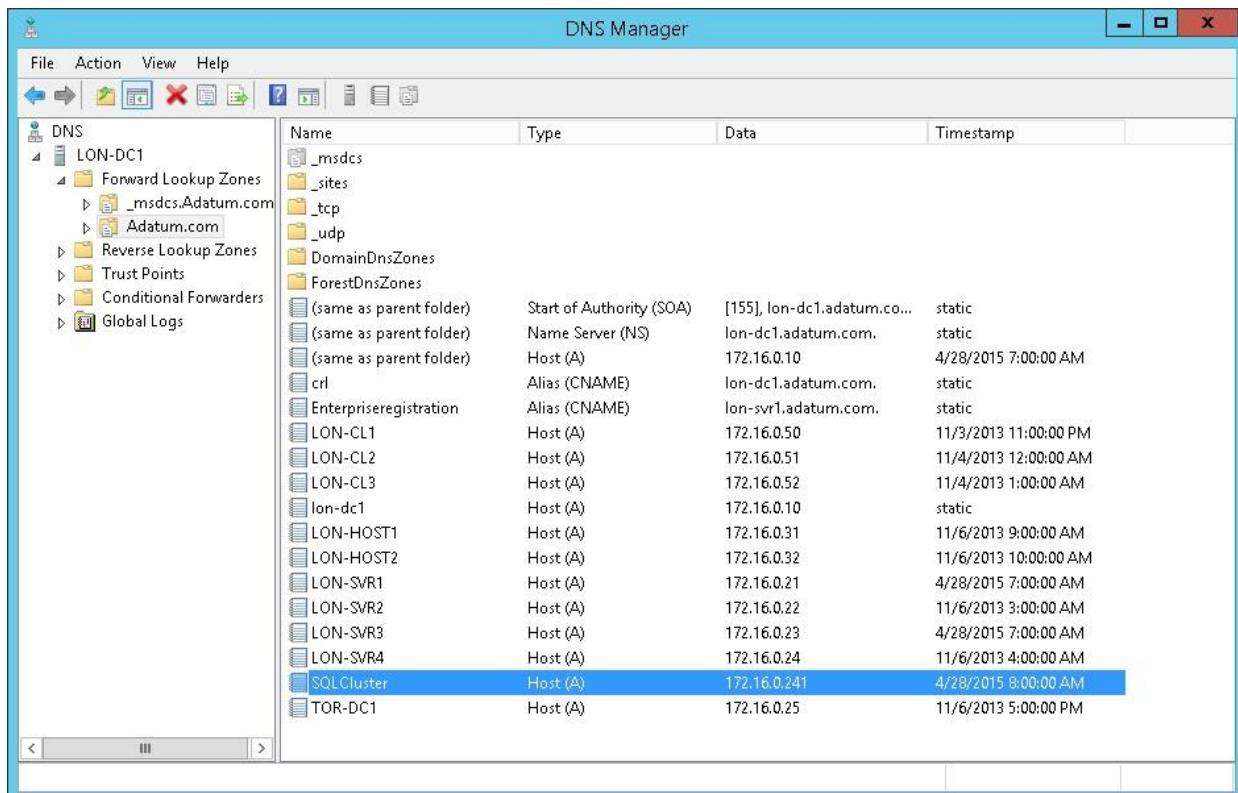
Provjerimo stanje u Failover Cluster Manageru. Dobili smo SQLCluster.Adatum.com, sa dva servera-člana (SVR1 i SVR3), trenutno bez rola (još nismo napravili instalaciju SQL-a), sa dvije Cluster mreže.



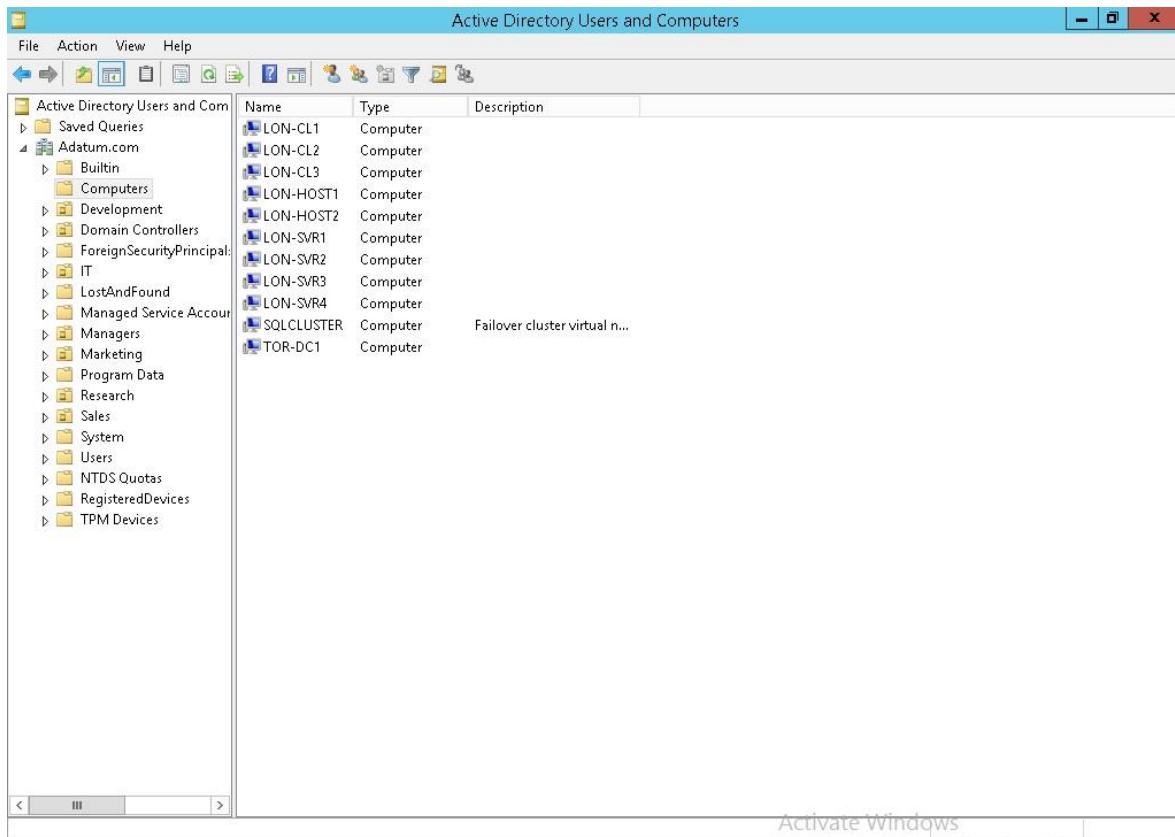




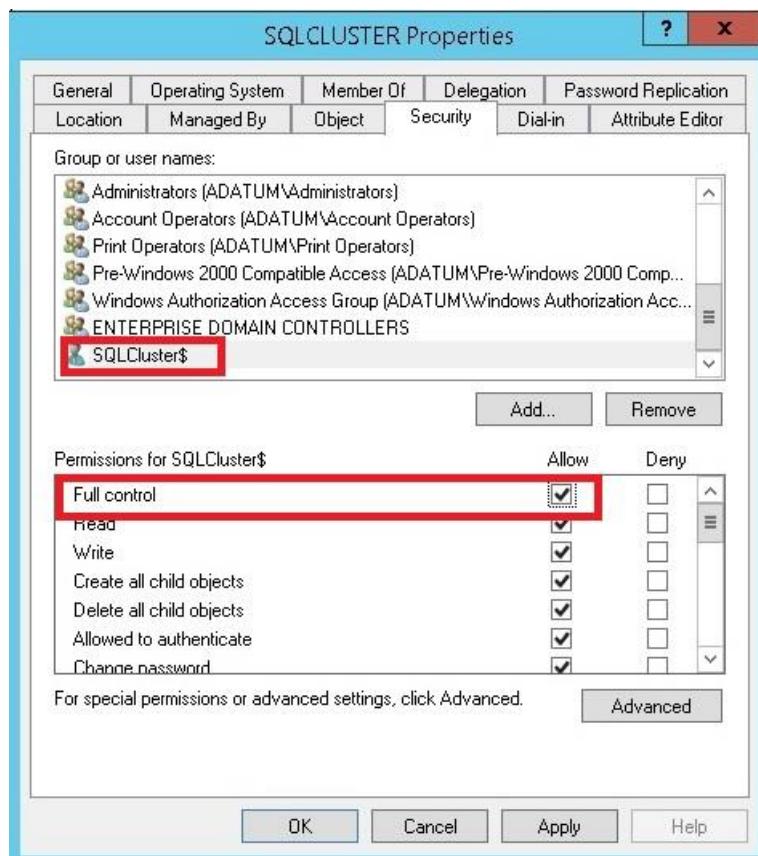
Slijedeći korak je odlazak u virtualnu mašinu DC1, gdje je potrebno podignuti DNS Manager i Active Directory Users and Computers konzolu. U DNS Manageru bismo morali u Adatum.com domeni vidjeti SQLCluster objekt kako je prikazano na slici:

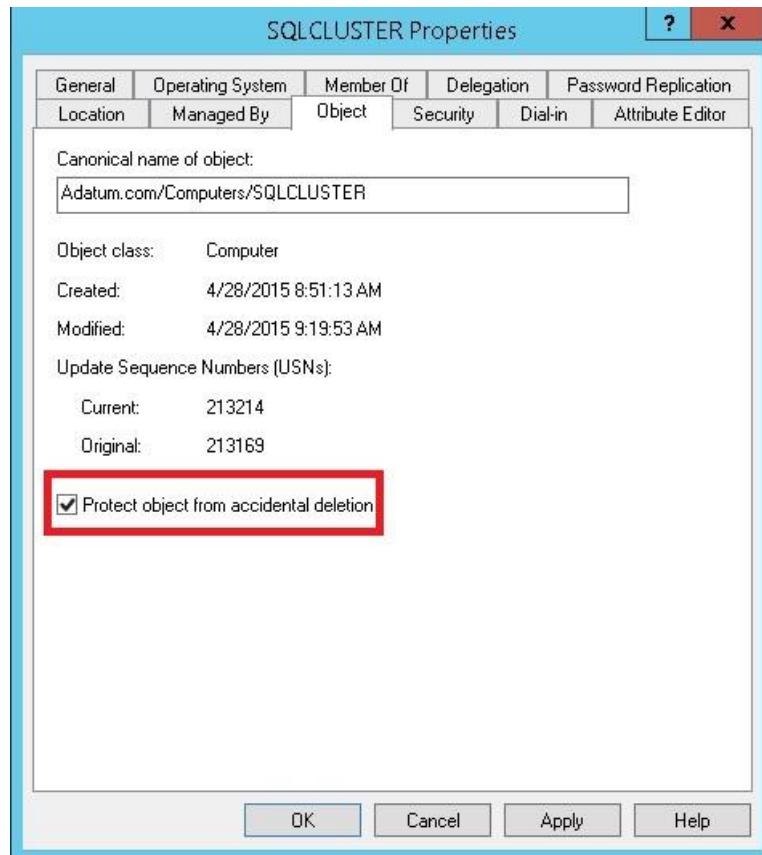


Također, u Active Directory Users and Computers konzoli bismo imati SQLCluster objekt u Computers containeru.

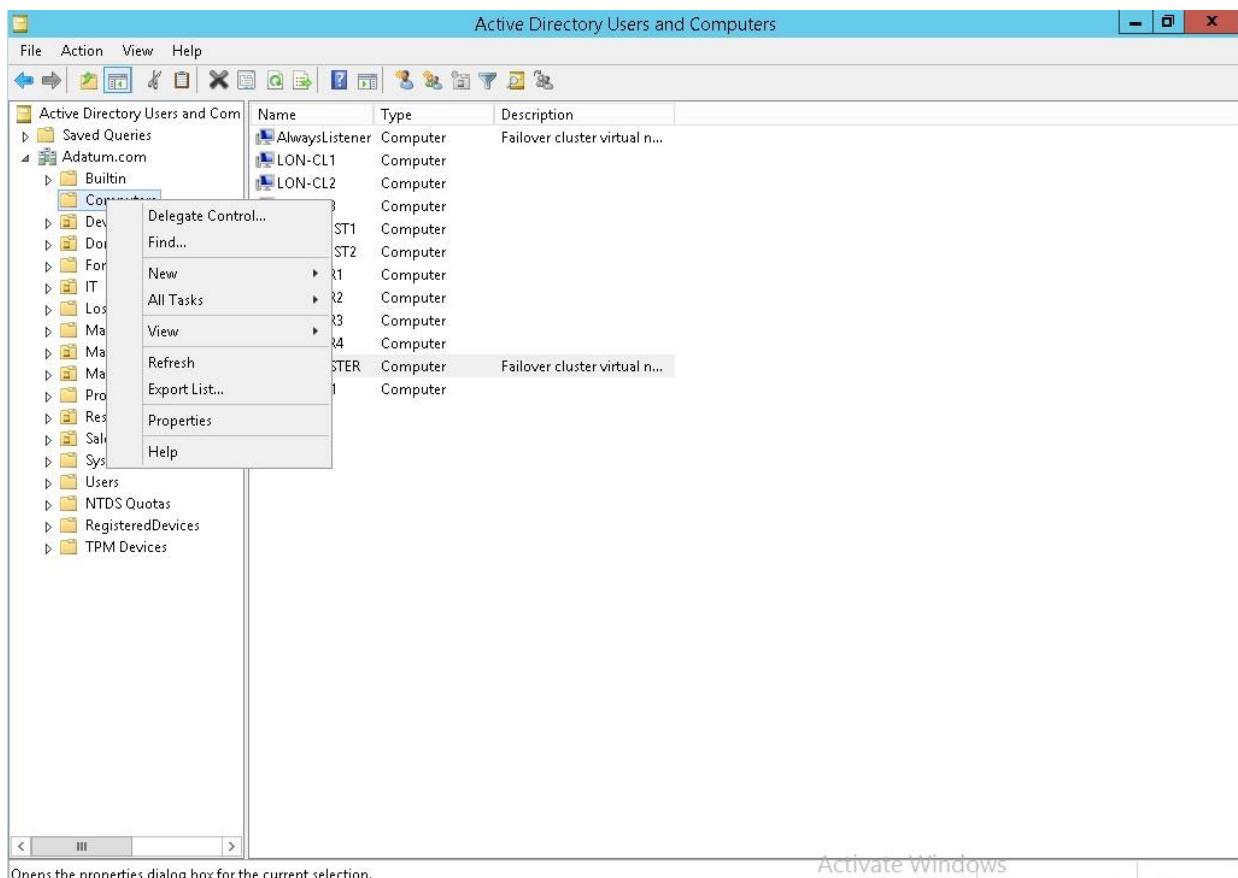


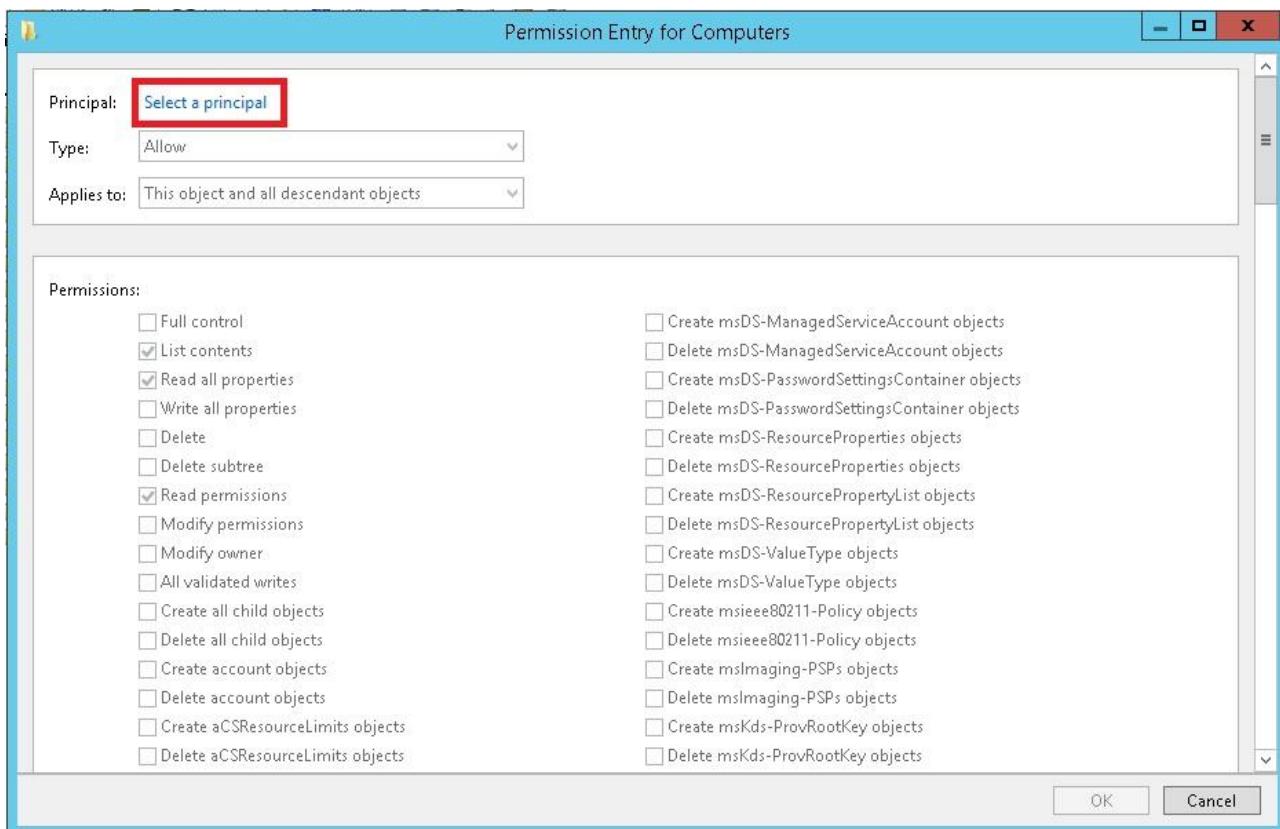
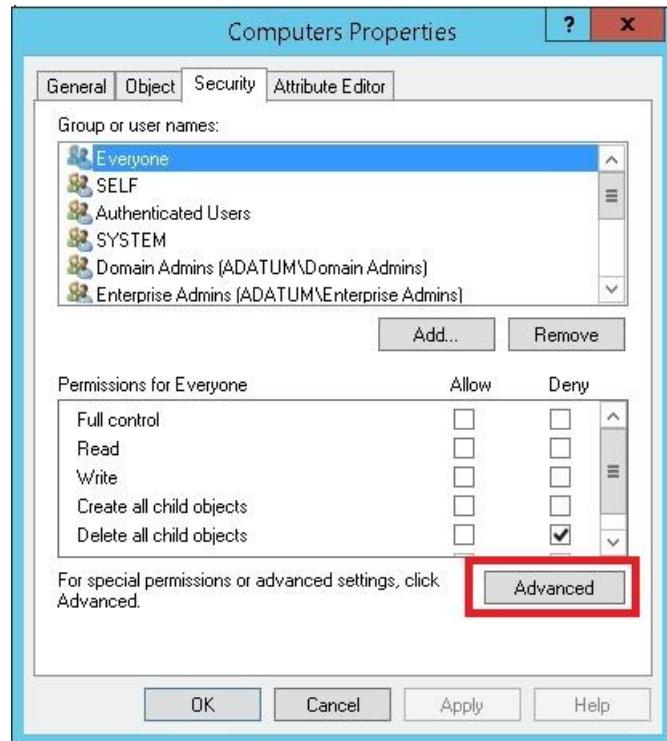
Ovaj objekt je potrebno zaštiti od slučajnog brisanja (desni klik na SQLCluster, Properties, klik na tab "Object", označiti na dnu "Protect object from accidental deletion"). Ako ne vidite tab "Object", pod "View" uključite "Advanced Features". Također, potrebno mu je dati i dodatne dozvole za kreiranje objekata u Computers containeru. Dakle, krenimo od desnog klika na SQLCluster objekta, odabirom Properties:



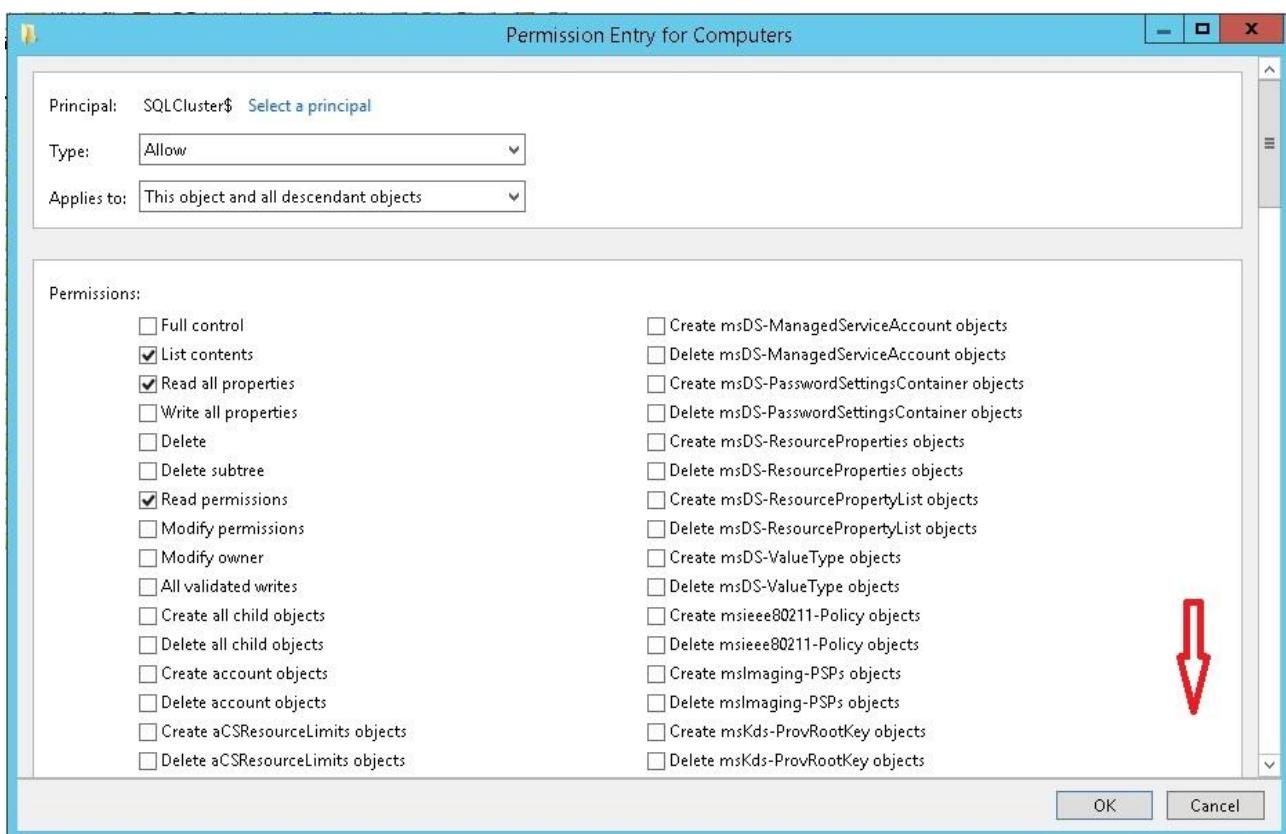
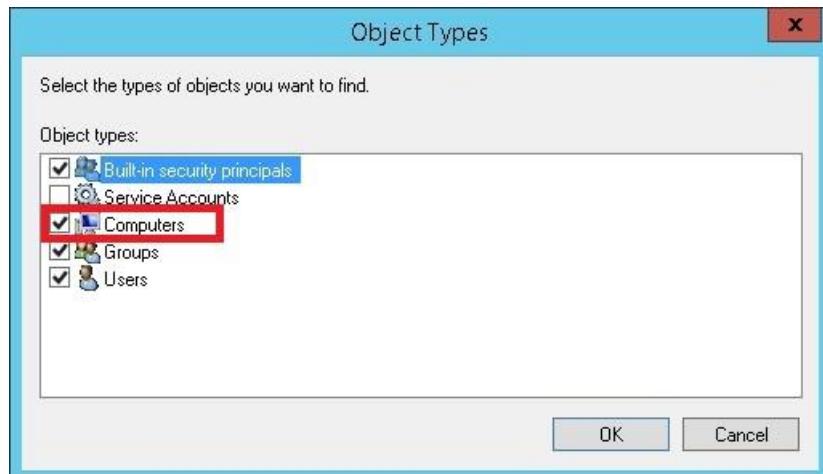


Slijedeći je korak desni klik na Computers container, klik na Properties, klik na Security tab gdje ćemo koristeći "Advanced", odabrat ćemo principala iz Computers containera i dopustiti SQLCluster objektu da kreira dodatne computer-objekte u dotičnom containeru:

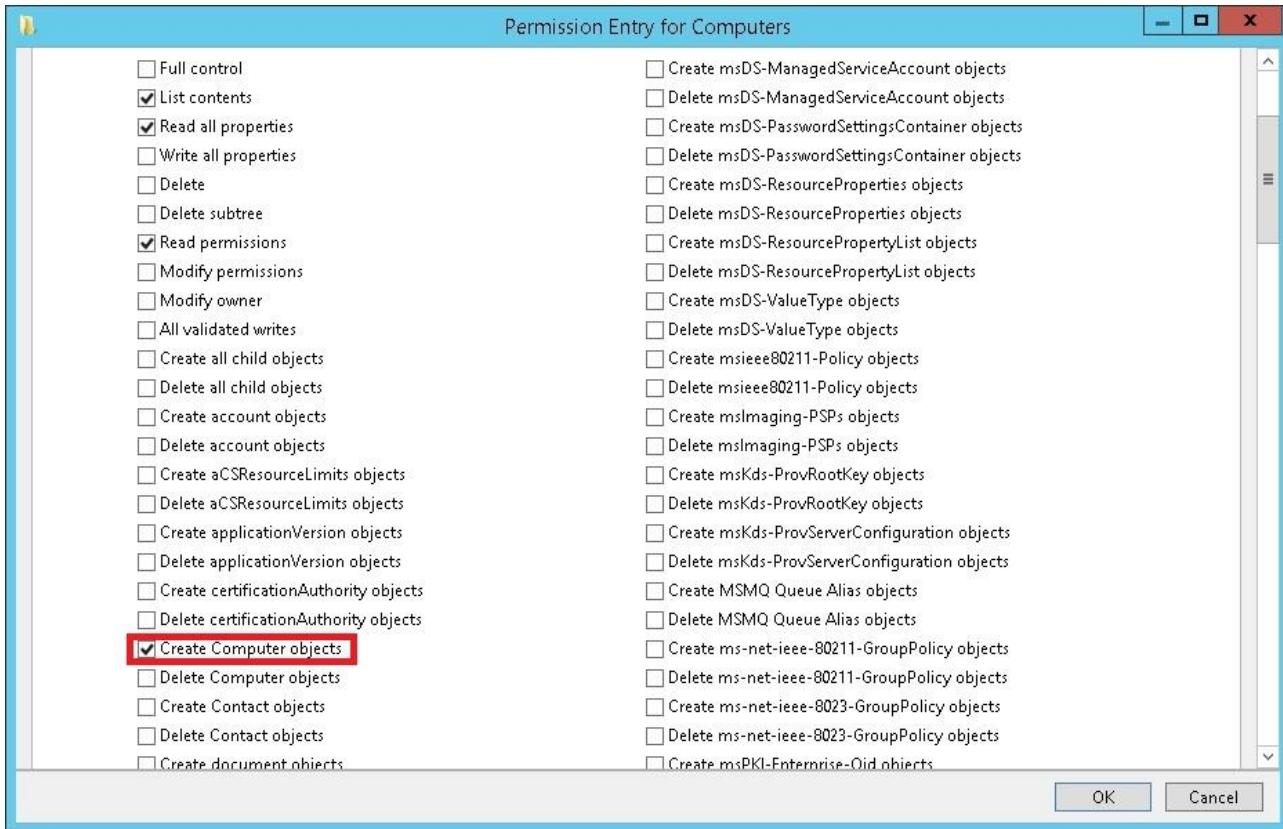




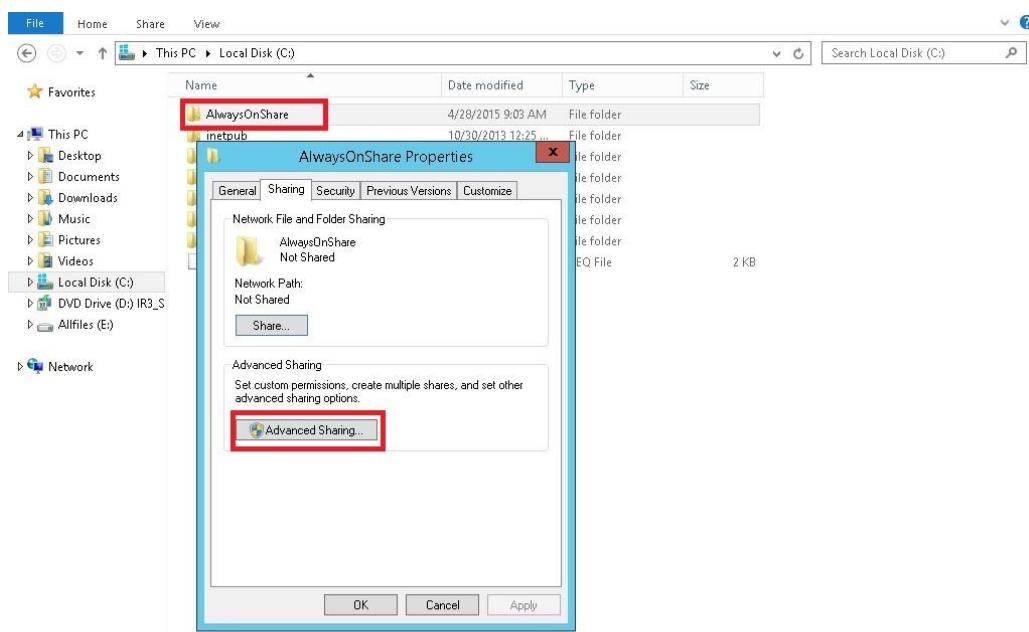
Kod pretraživanja principala, odaberimo "Object types" i označimo "Computers":

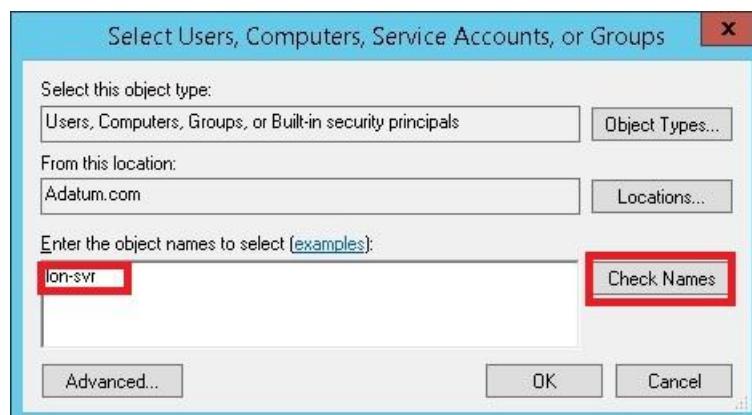
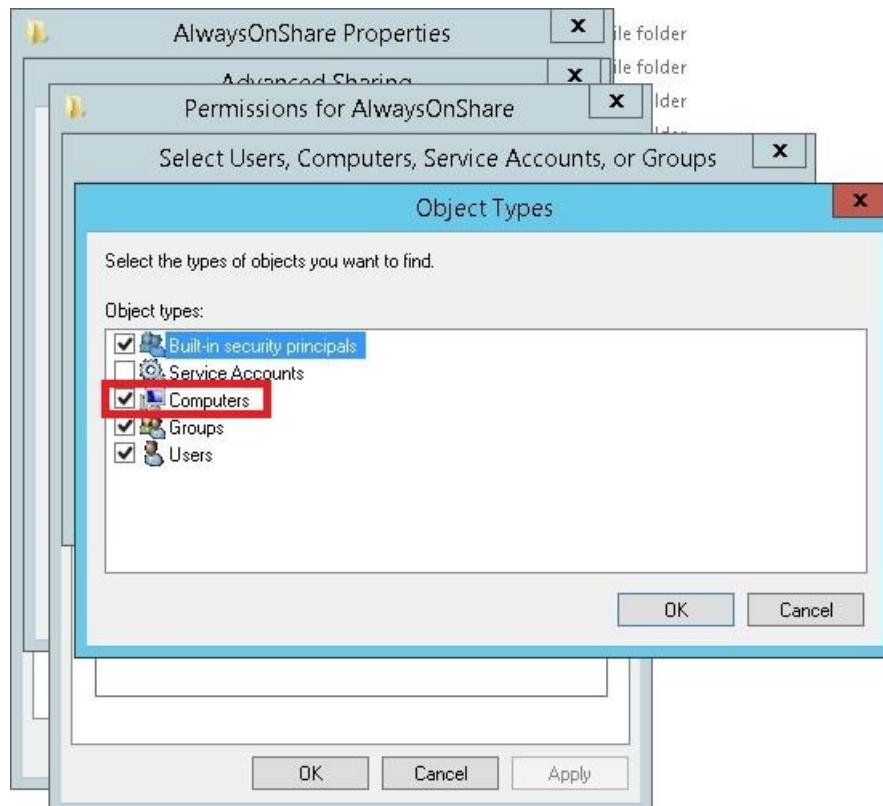
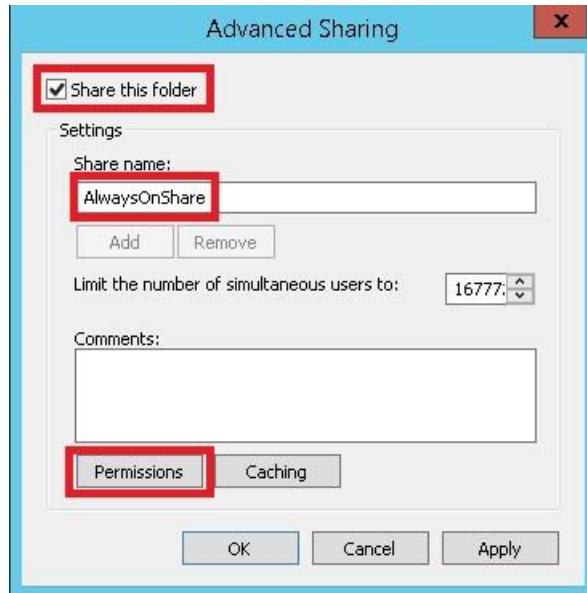


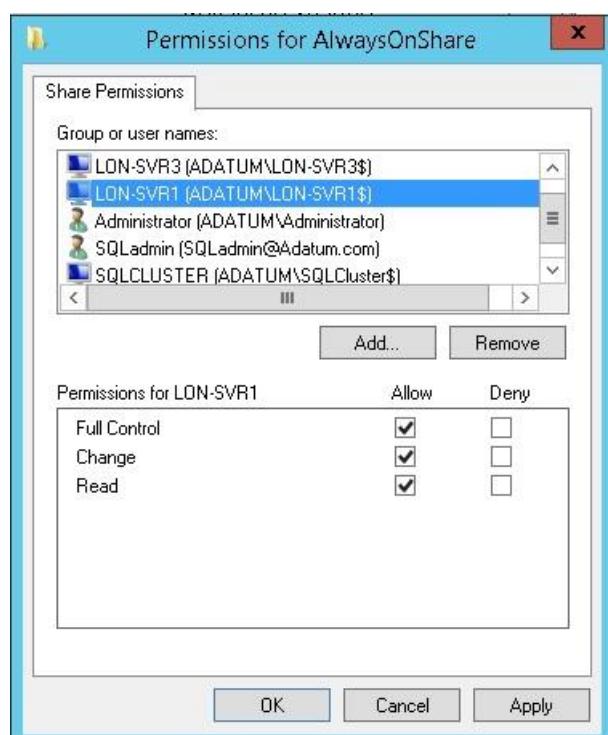
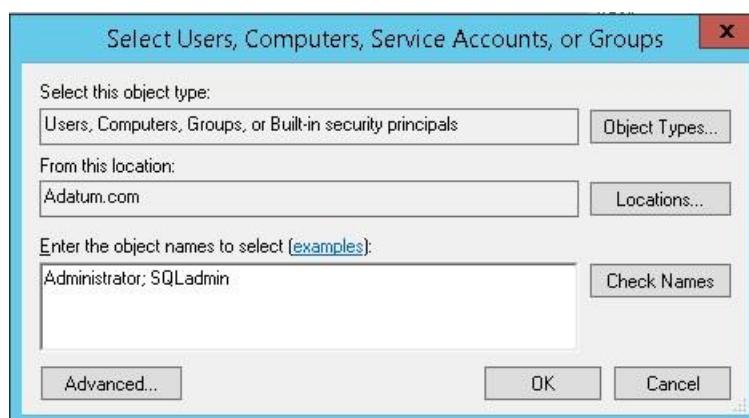
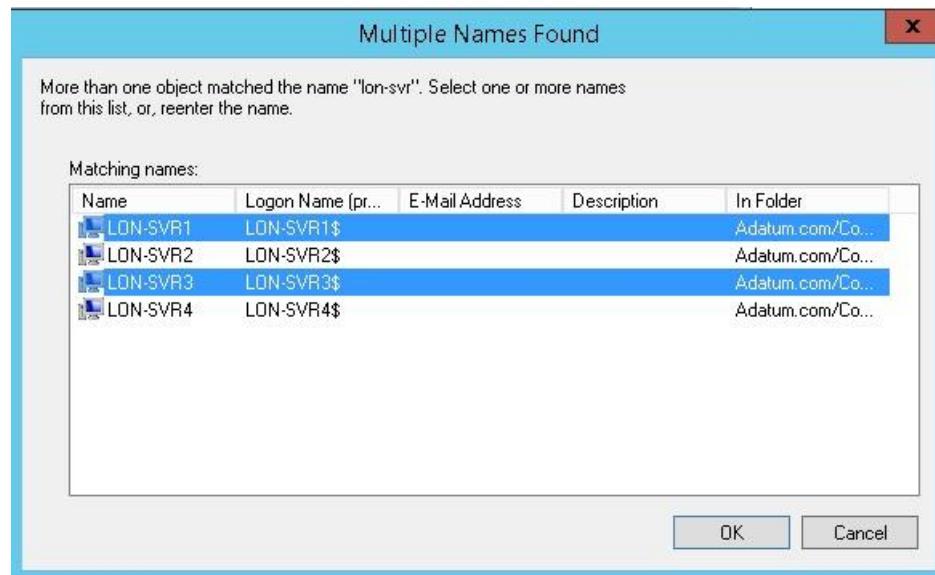
Potrebno je mišem scroll-ati mlo prema dolje i označiti "Create Computer objects" te iz svih podmenija izaći sa afirmativnim akcijama (OK, Apply, dok se ne vratimo natrag u Active Directory Users and Computers konzolu).



Slijedeći je korak kreiranje dijeljenog direktorija (*share*), kojeg ćemo koristiti za sinhronizaciju cluster-a. S obzirom na činjenicu da vježbu radimo sa tri virtualne mašine (DC1, SVR1 i SVR3), jedino je logično mjesto za konfiguraciju share-a DC1. U produkciji se ovakve lokacije nikada ne stavljuju na domenske kontrolere, ali s obzirom na zahtjeve vježbe i simulaciju kako radi AlwaysOn cluster, poslužiti ćemo se sa DC1. Direktorij i share ćemo nazvati AlwaysOnShare, i podesiti dozvole. Moramo računalima SVR1 i 3, AD objektu SQLCluster i korisnicima Administrator i SQLAdmin dati Full Control dozvole na shareu:







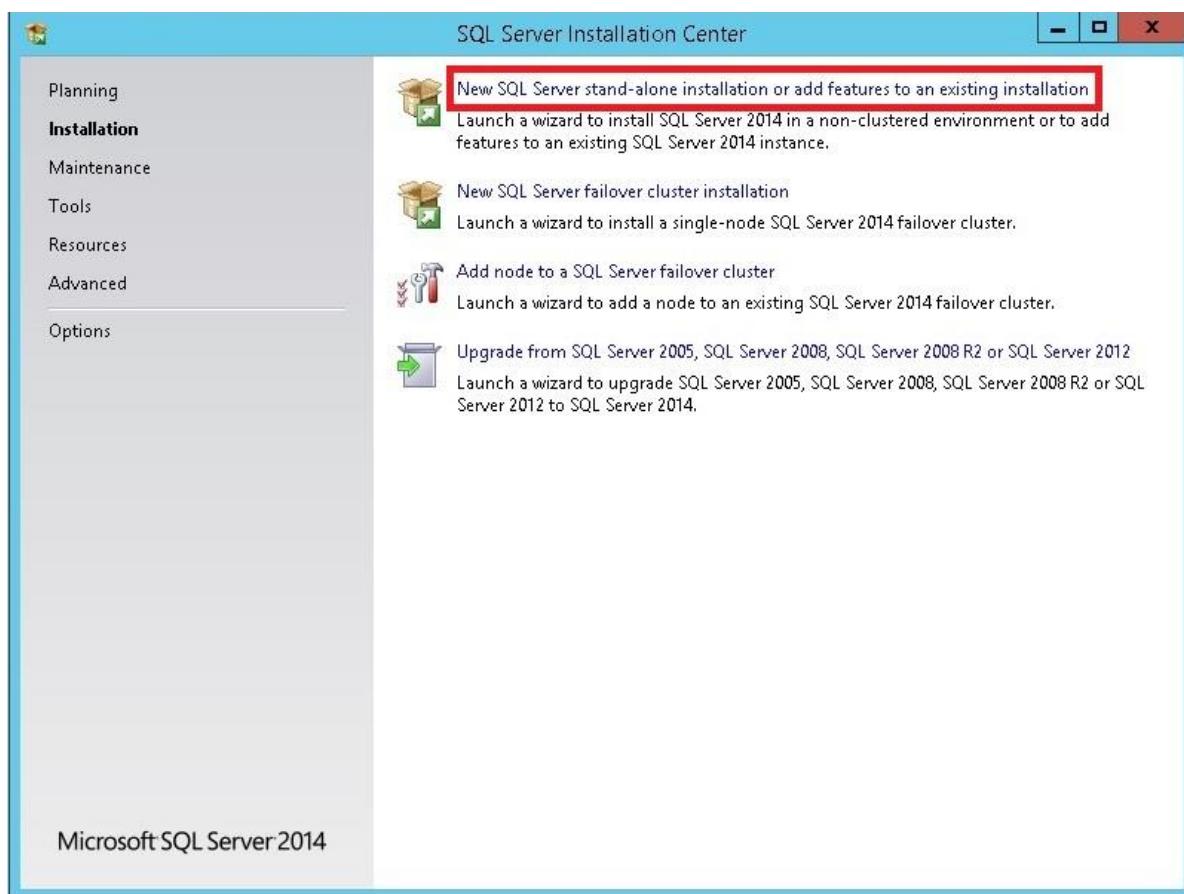
Konfiguracija i priprema za instalaciju SQL AlwaysOn Clustera je gotova. Slijedeći je korak instalacija SQL Server 2014 na SVR1 i SVR3.

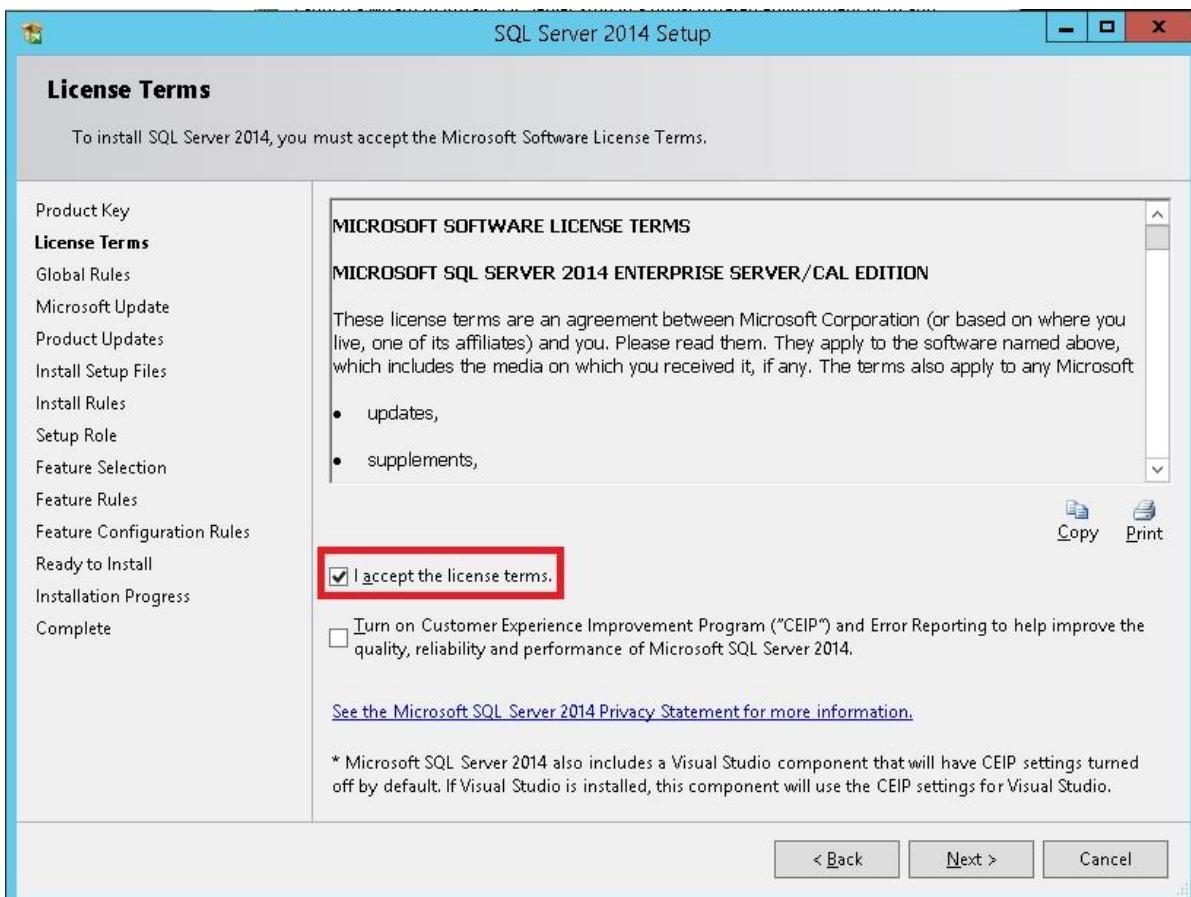
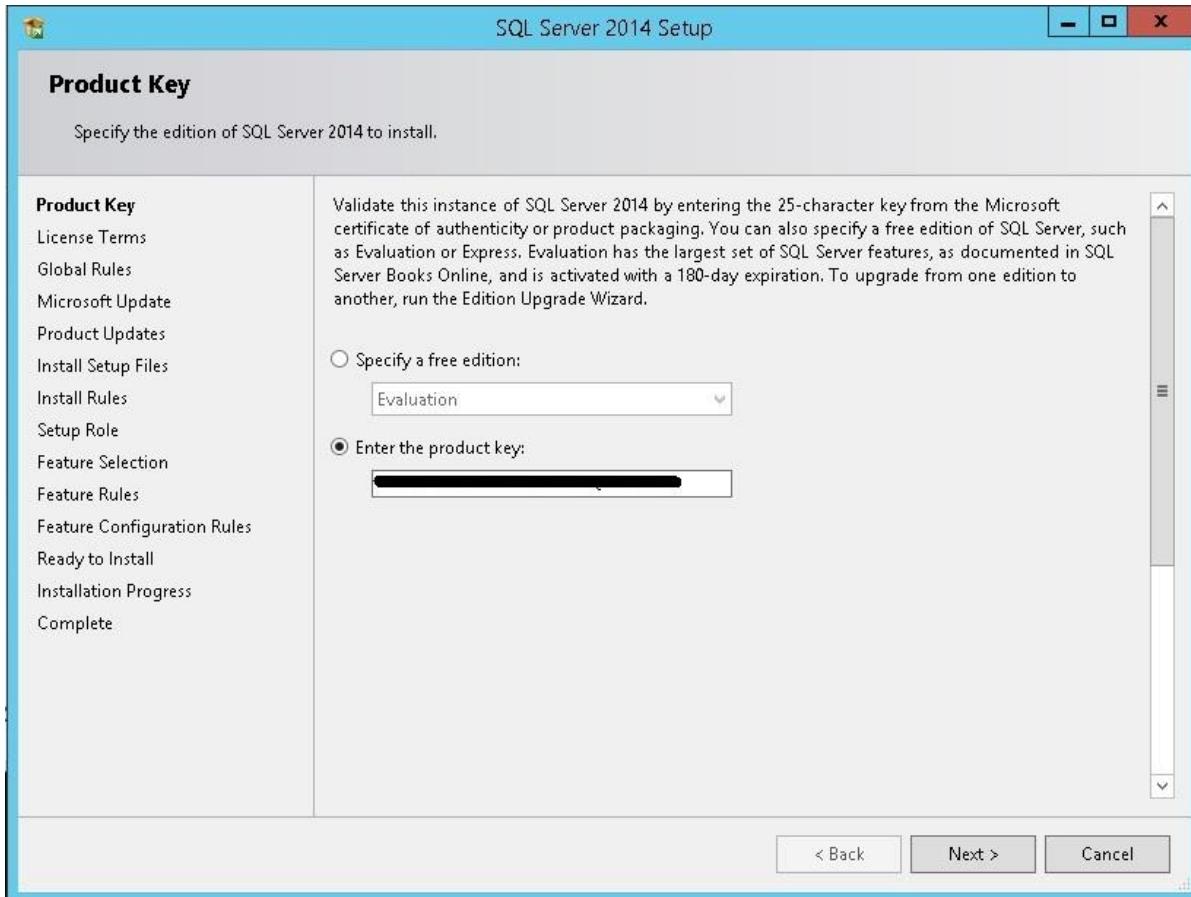


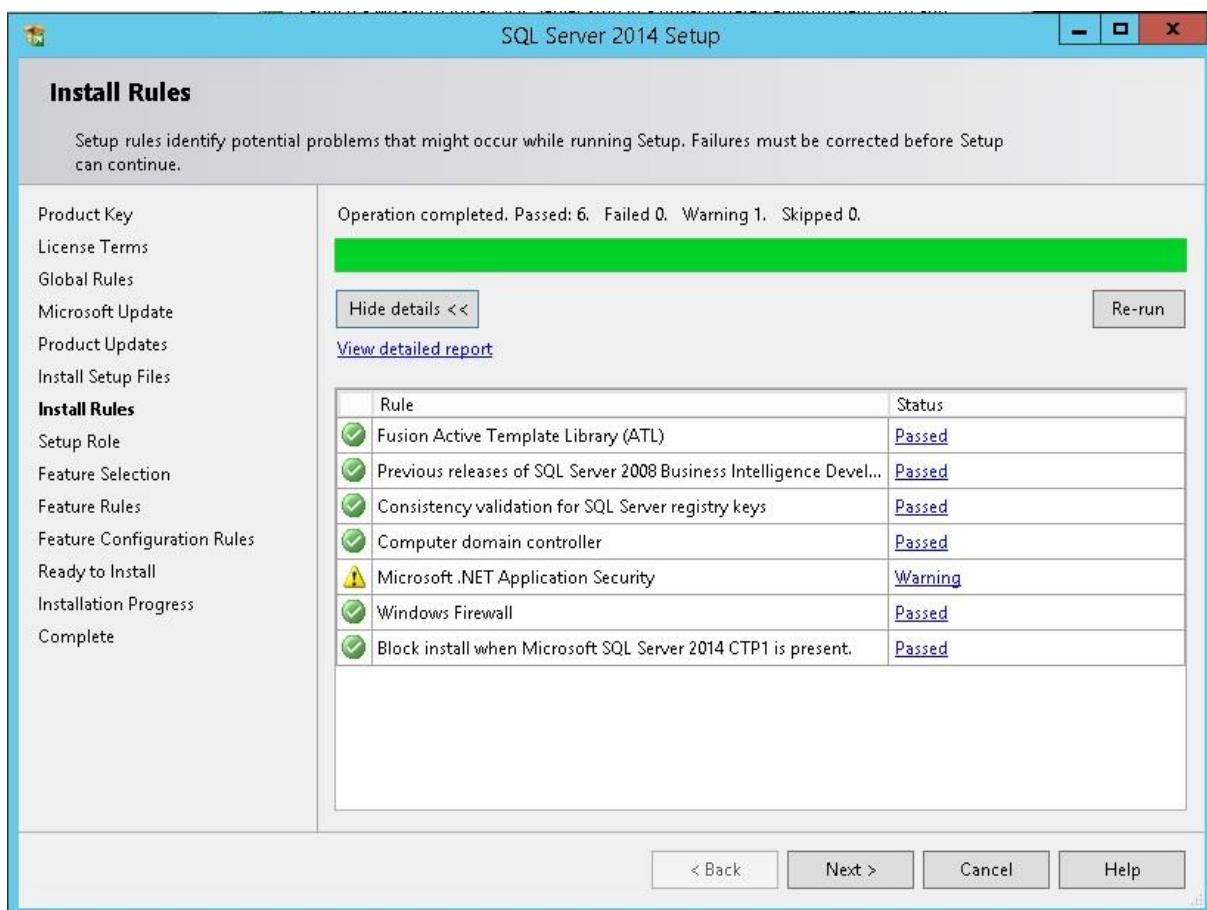
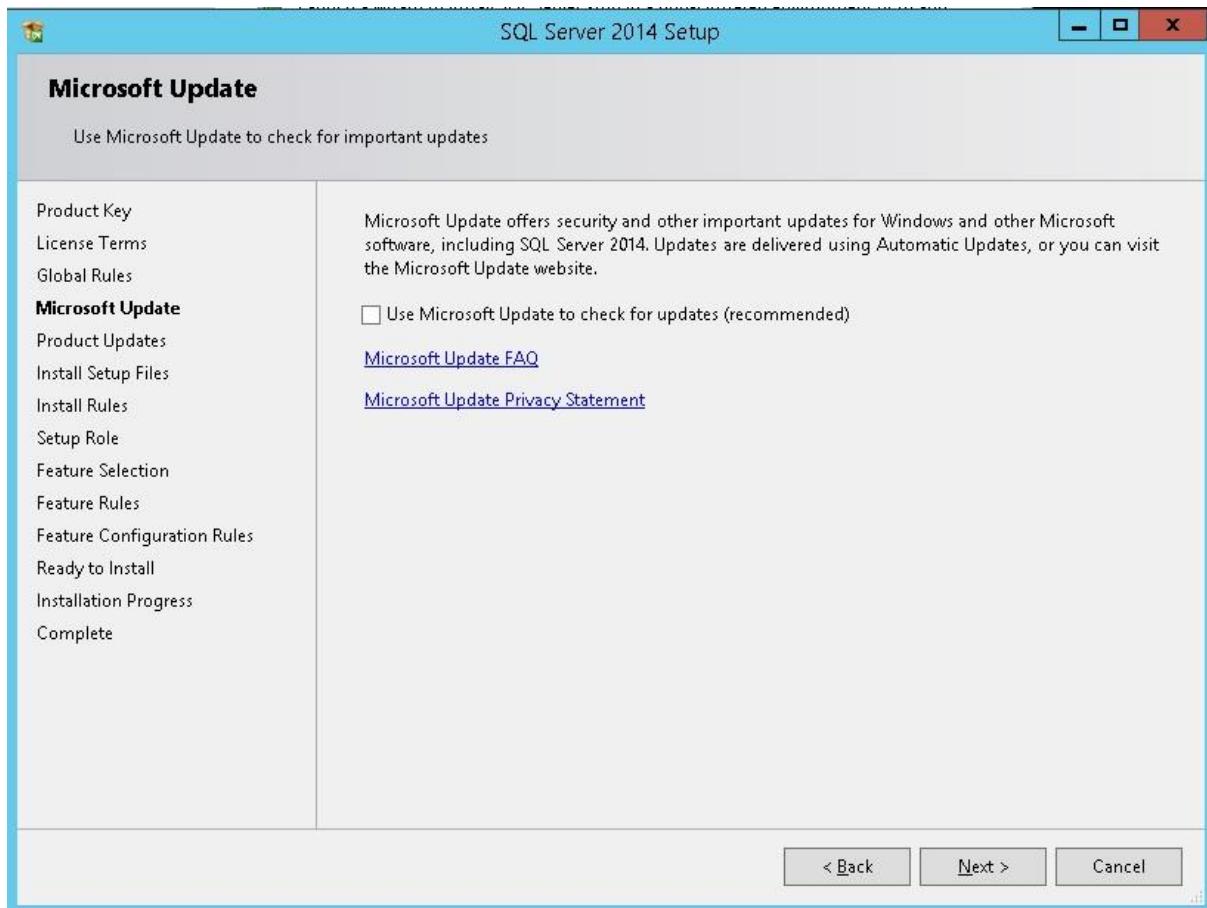
## Instalacija Microsoft SQL 2014

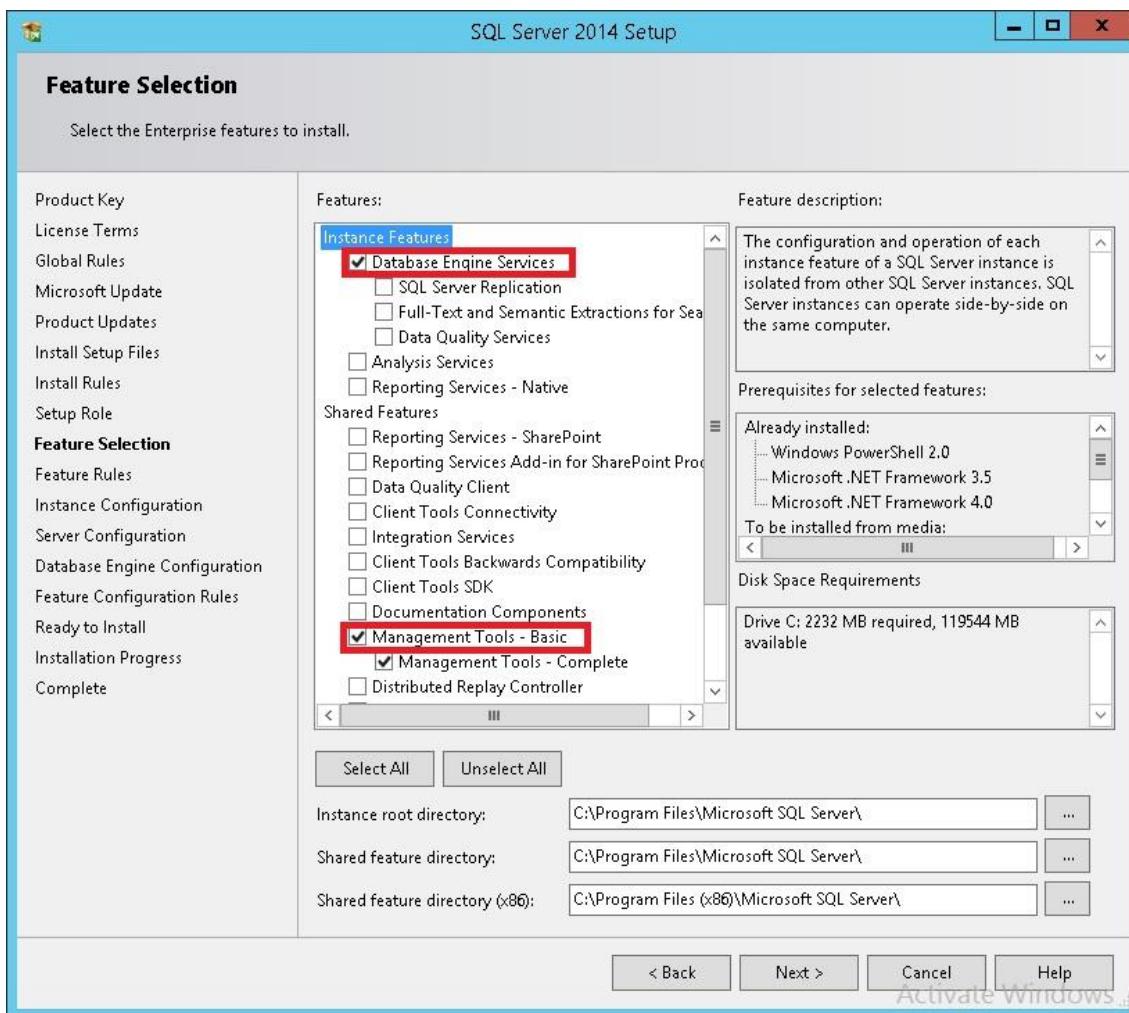
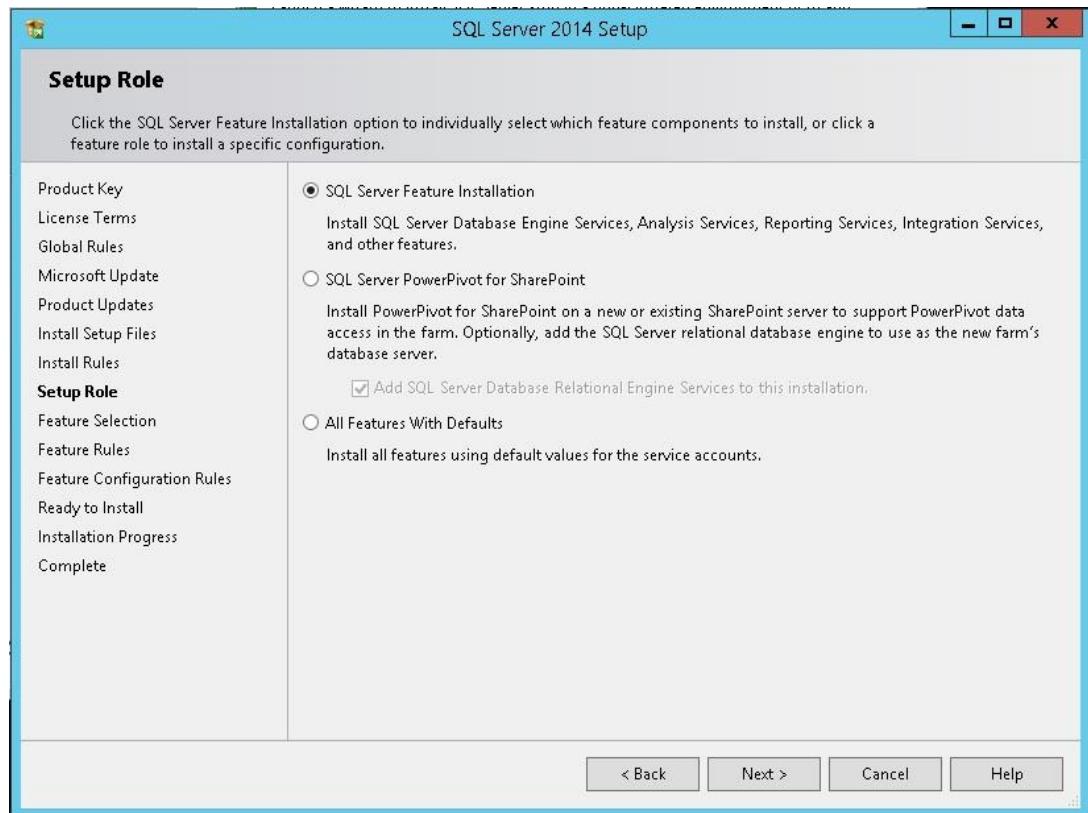
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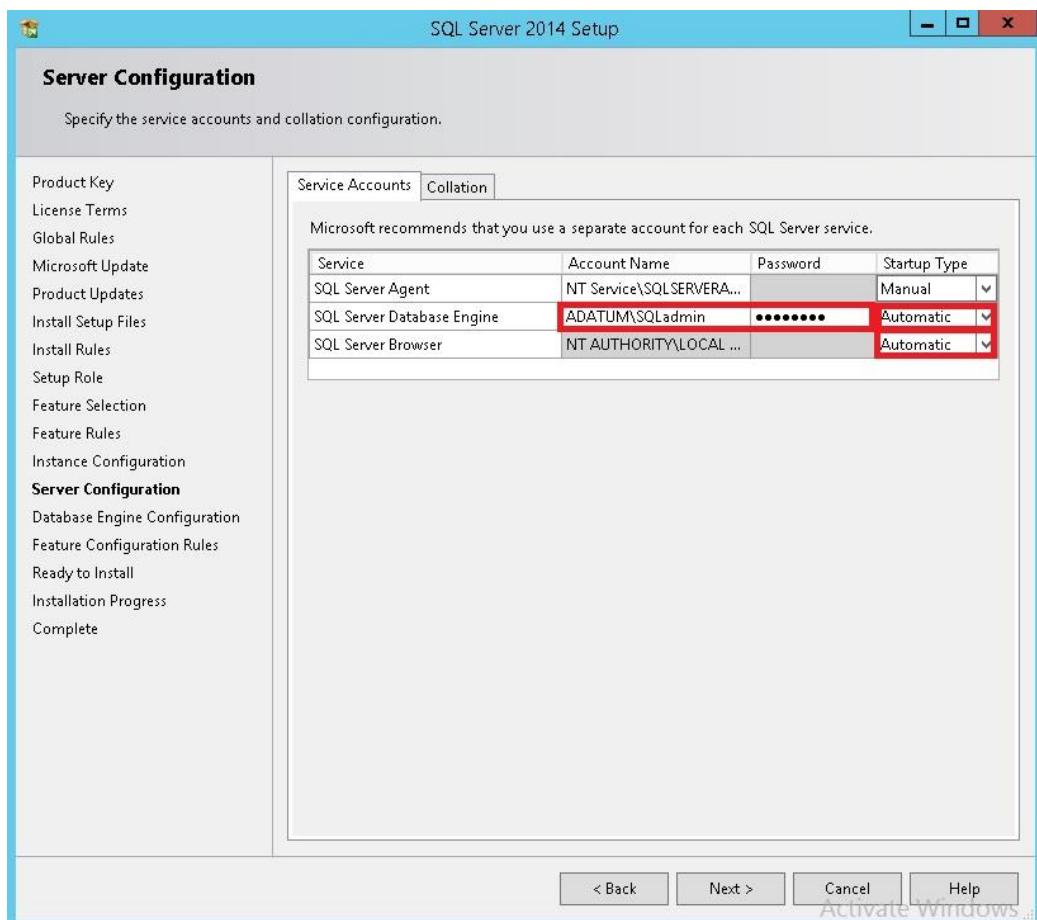
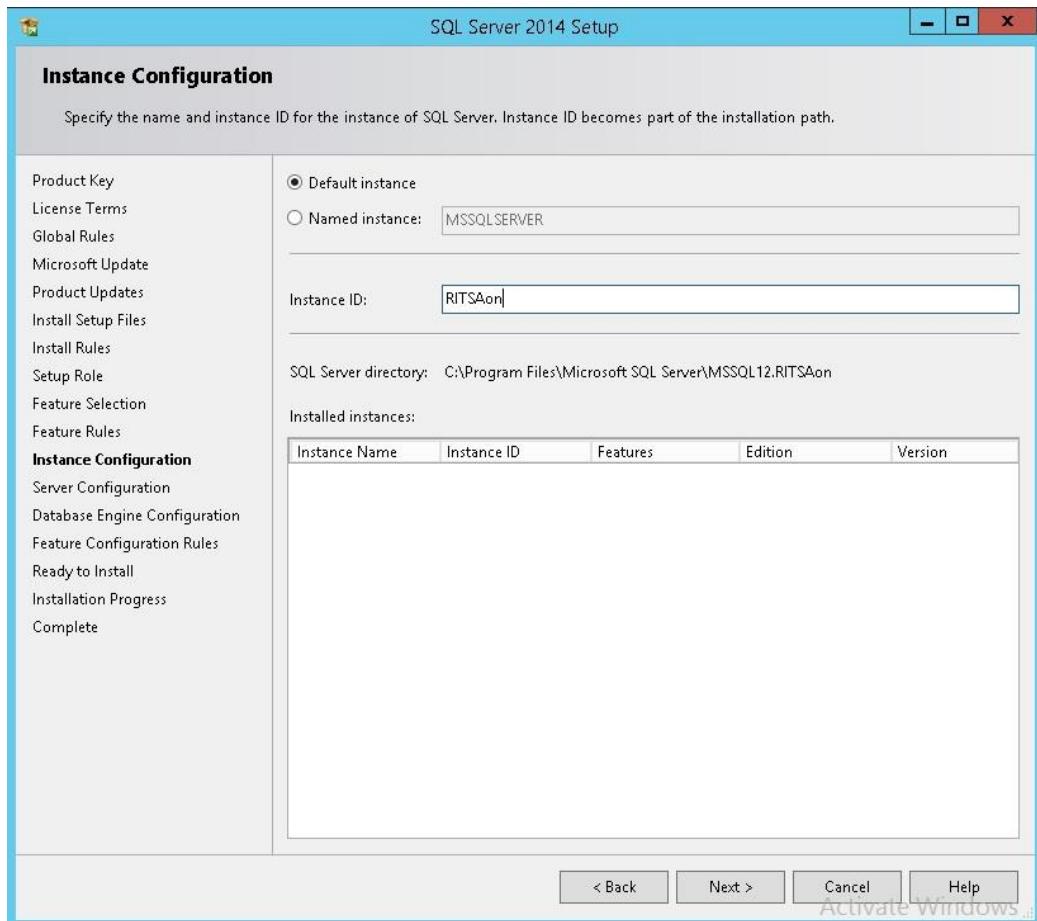
U virtualne mašine SVR1 i SVR3 potrebno je dodati SQL isto u virtualni CD/DVD uređaj. ISO datoteka nalazi se u direktoriju E:\KZOS\Instalacije. Možemo ju odmah dodati u obje virtualne mašine pošto moramo napraviti instalaciju na obje. Demonstrirati ćemo instalaciju na SVR1, uz napomenu da je **nakon završetka instalacije na SVR1 identičnu proceduru potrebno napraviti i na SVR3**.

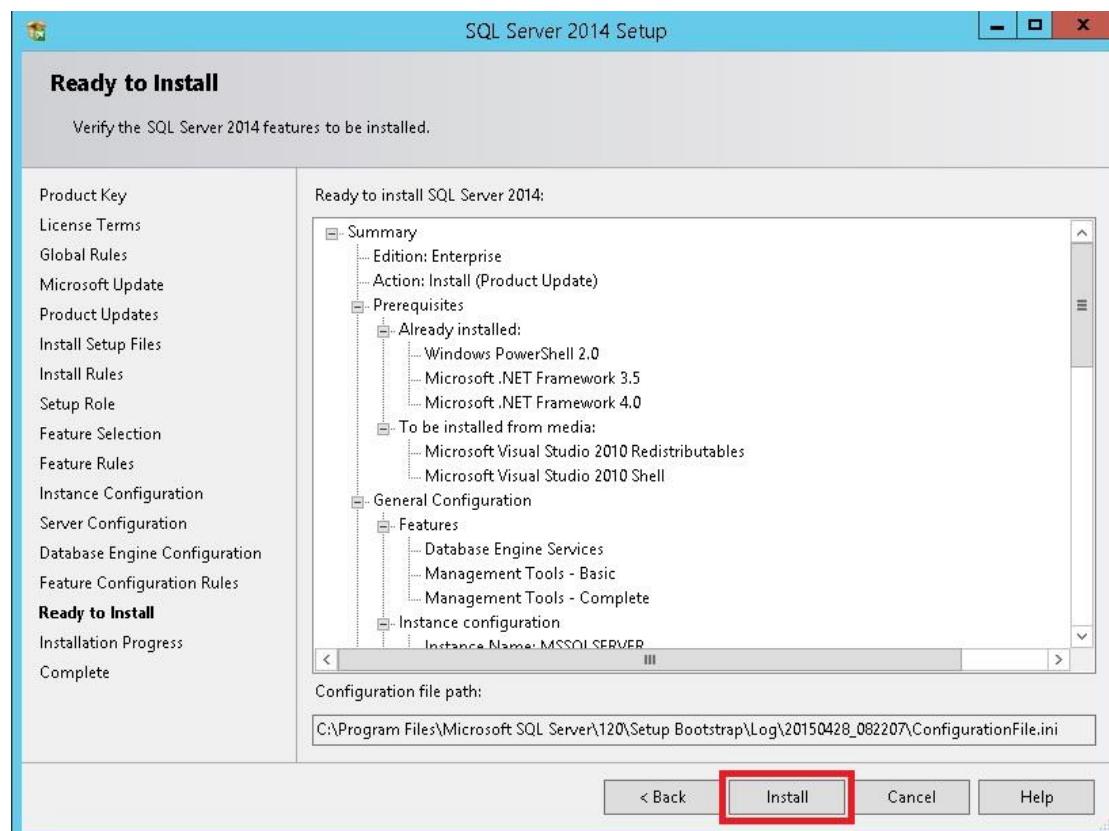
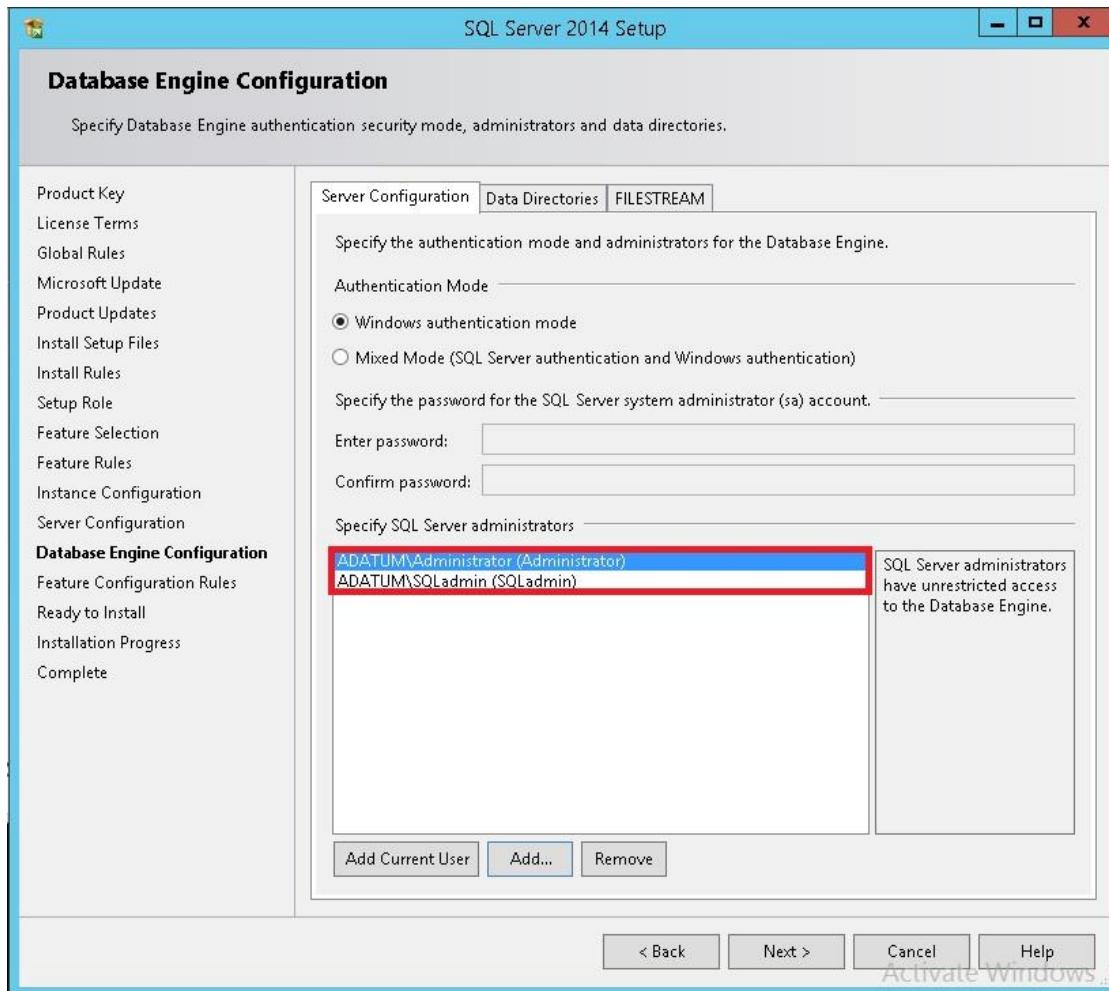










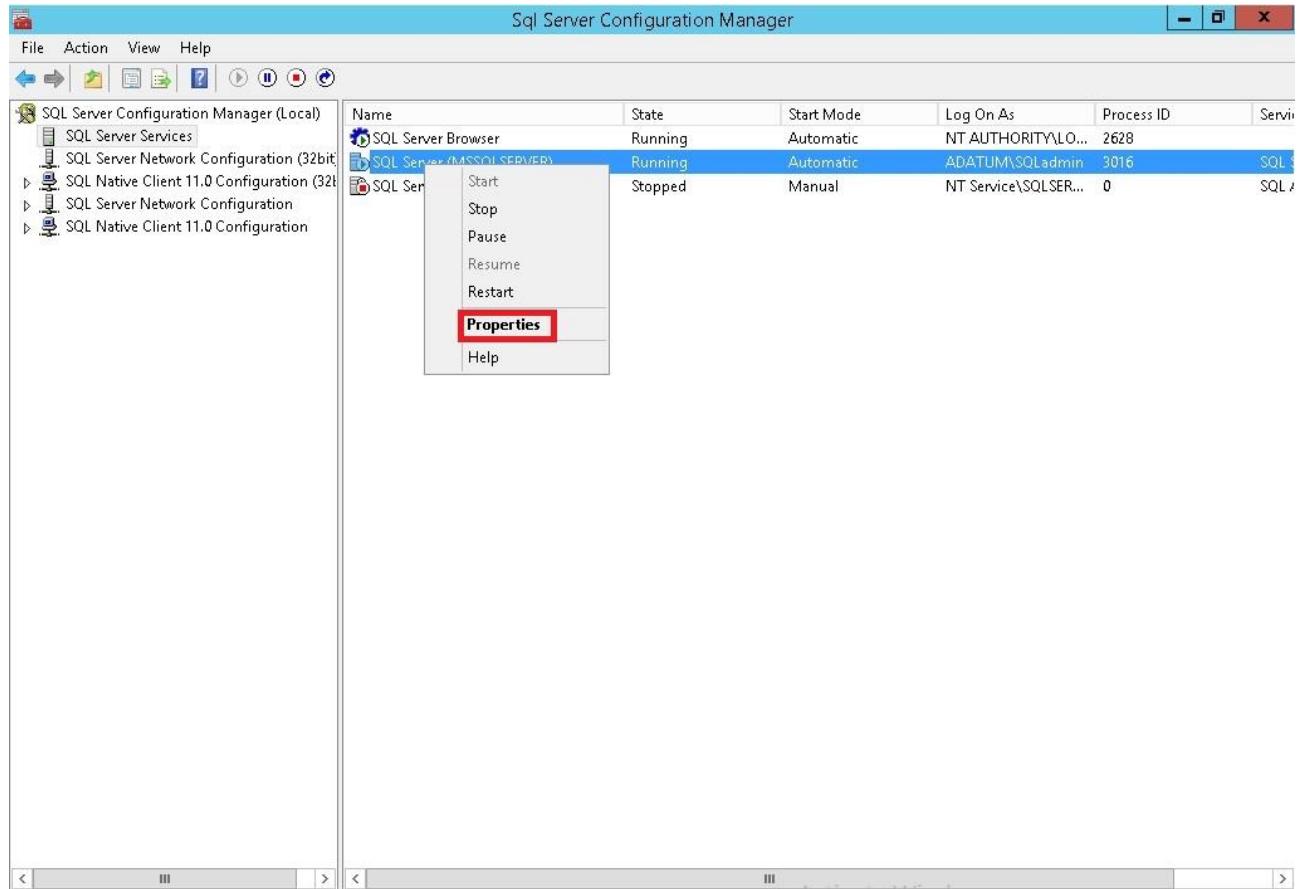


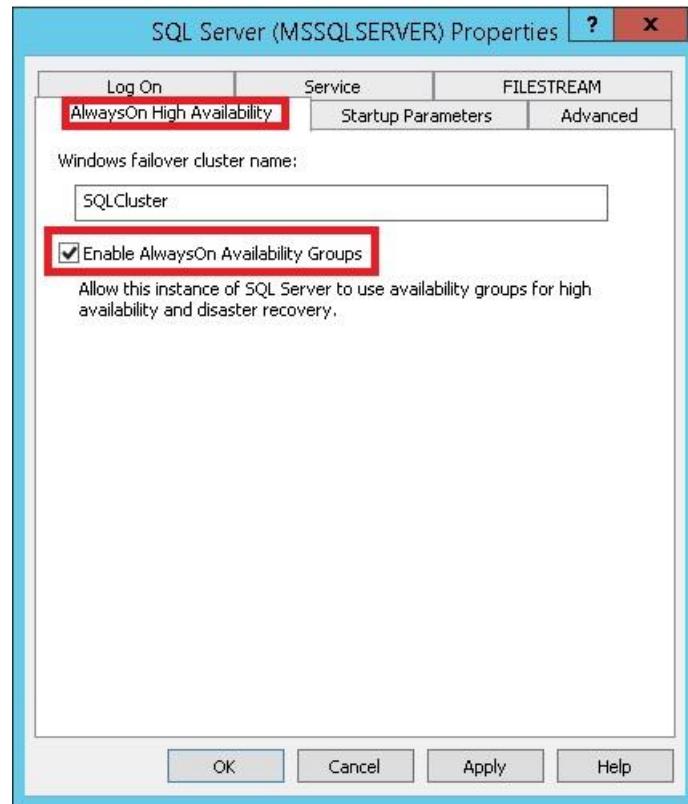


Kada instalacija završi, zatvorite prozor i početni instalacijski prozor te identičnu instalaciju napravite i na SVR3 virtualnoj mašini.

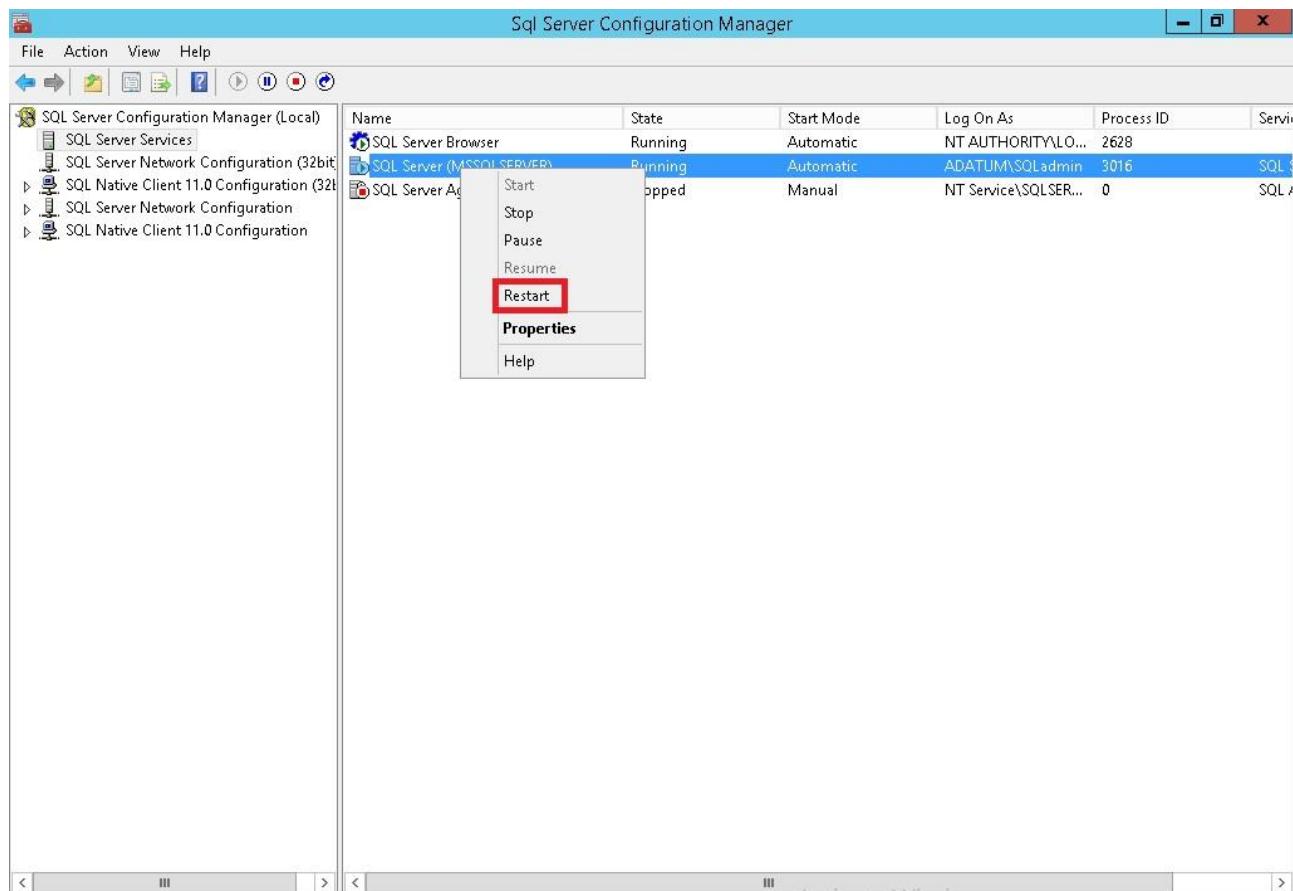
## Konfiguracija AlwaysOn Microsoft SQL 2014 clustera

Poslijednji korak procedure je konfiguracija AlwaysOn clustera. Prvo je potrebno podići SQL 2014 Configuration Manager i uključiti AlwaysOn High Availability. To ćemo postići konfiguracijom instalirane SQL Server instance:



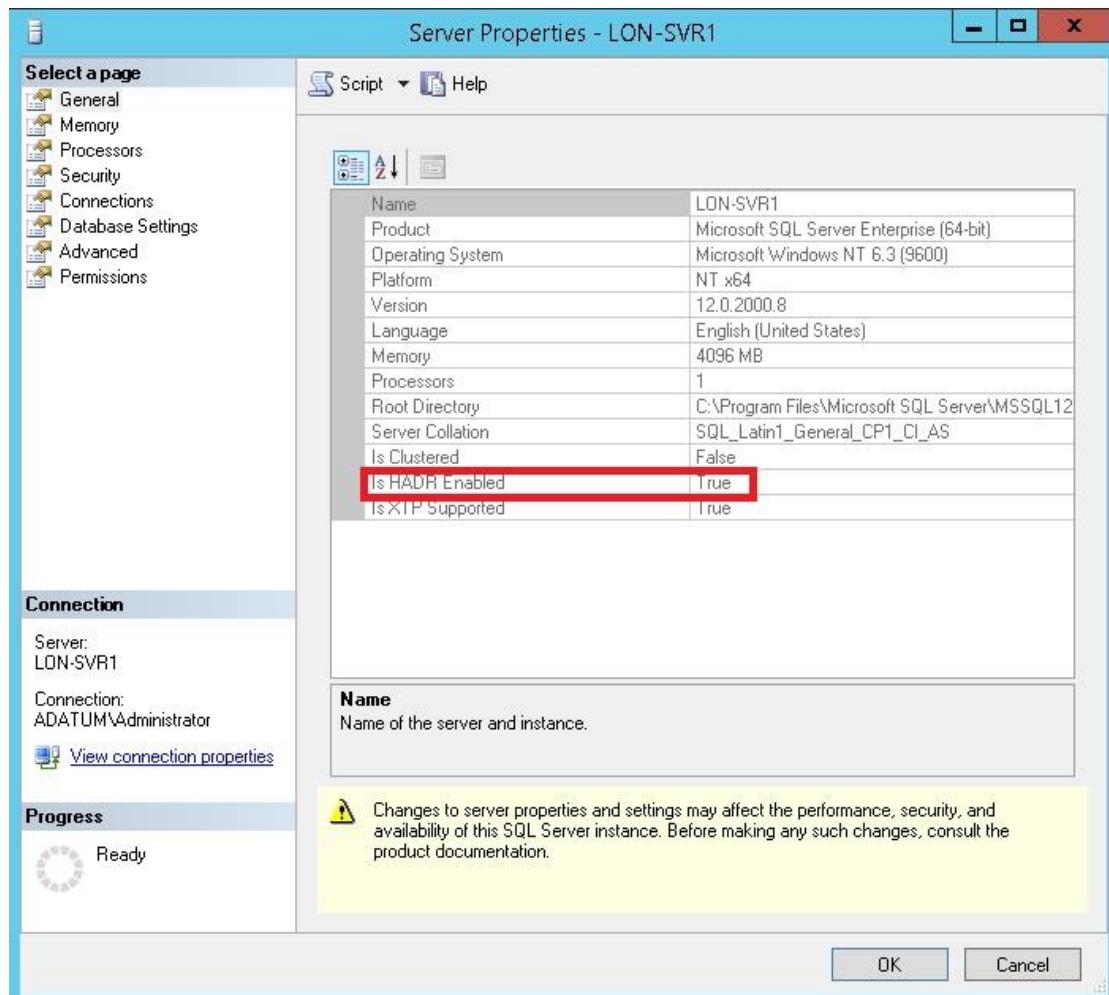
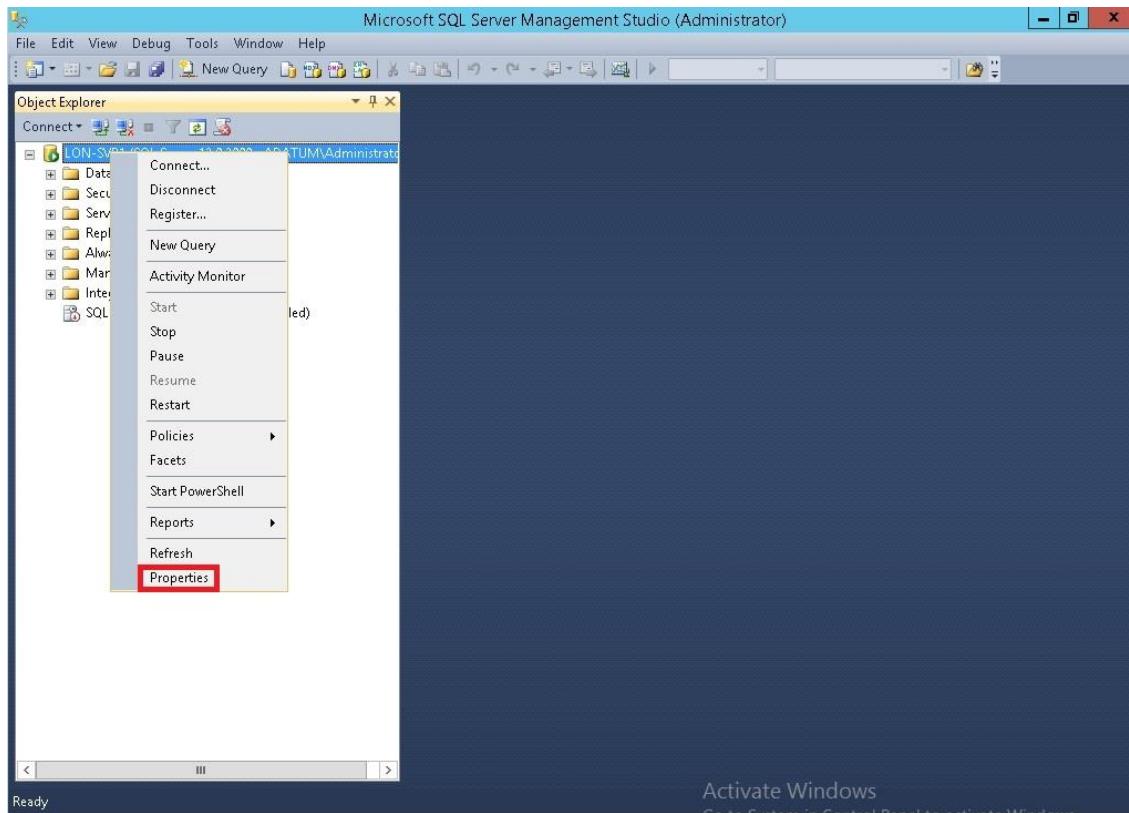


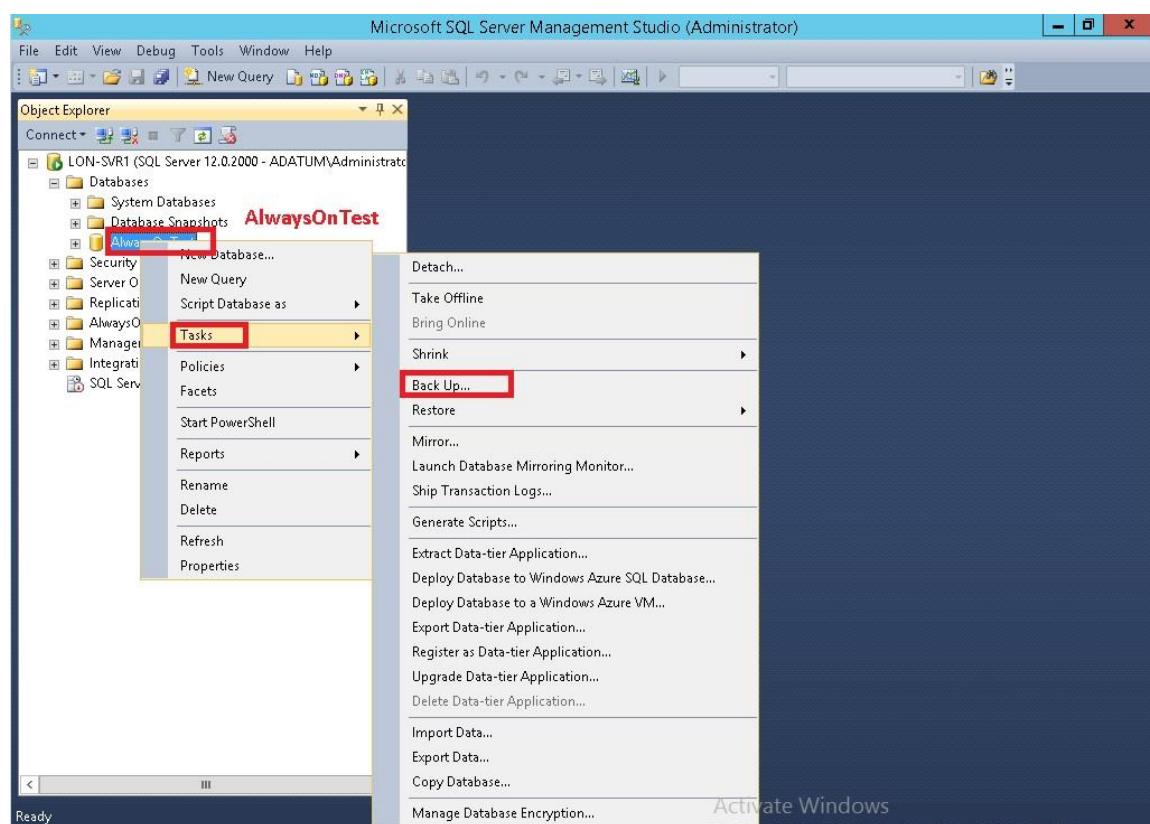
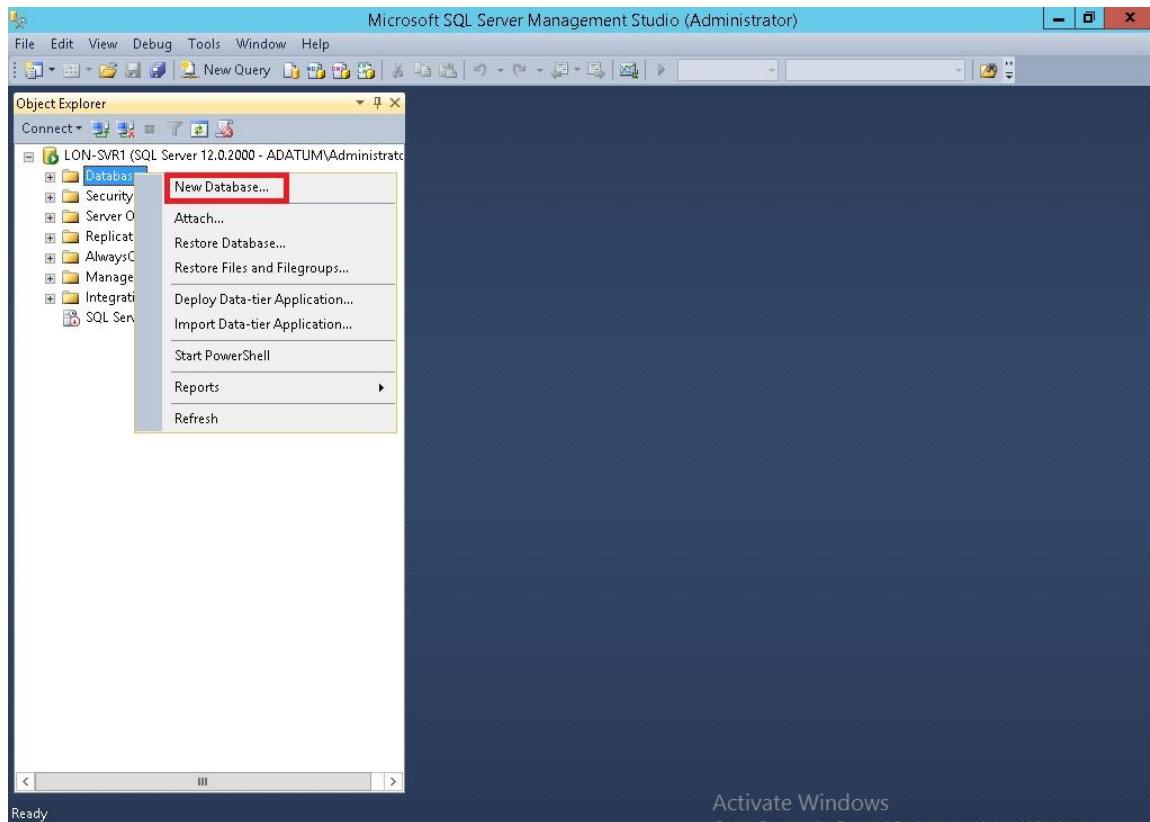
Nakon konfiguracije, potrebno je napraviti restart servisa:

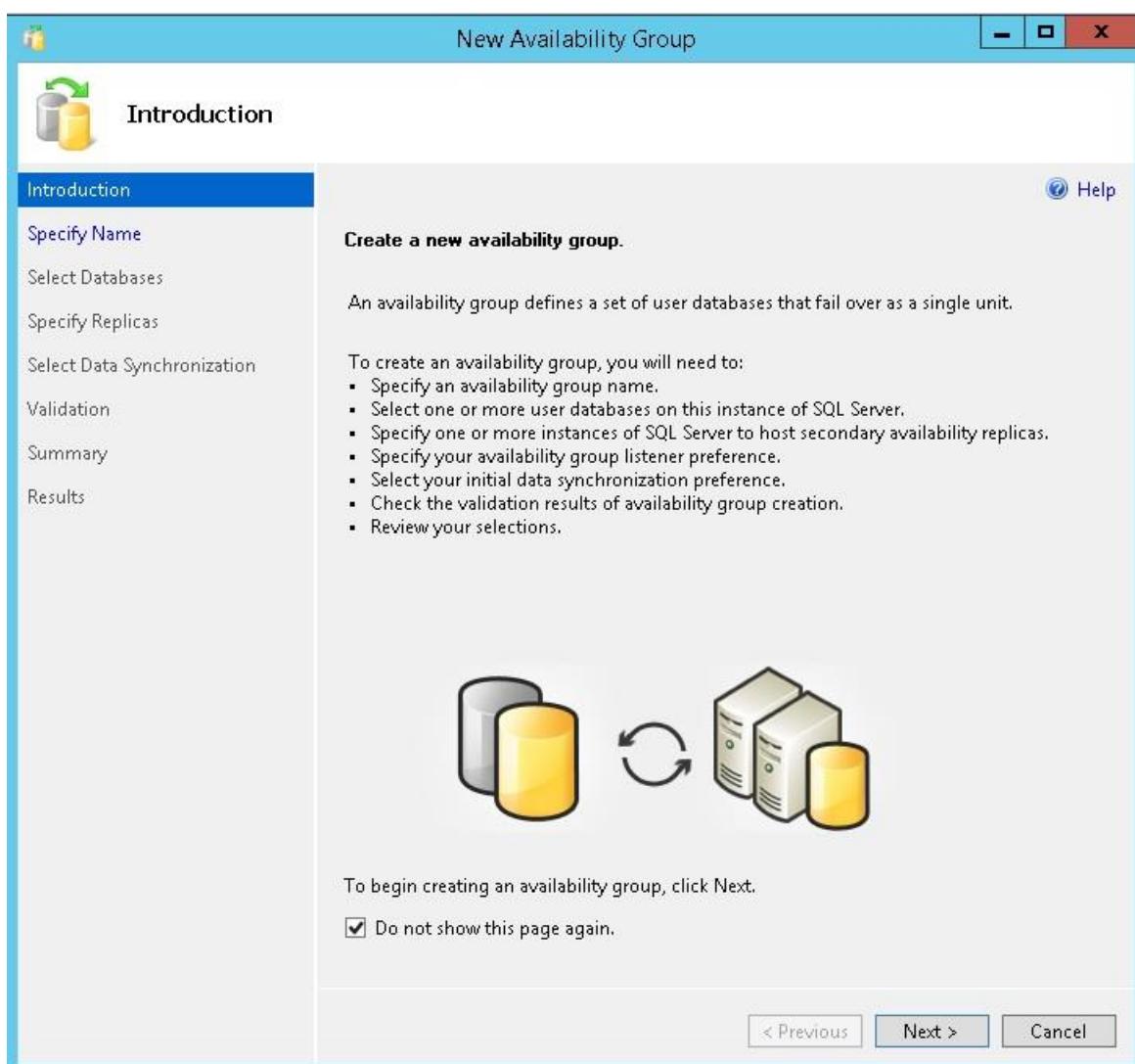
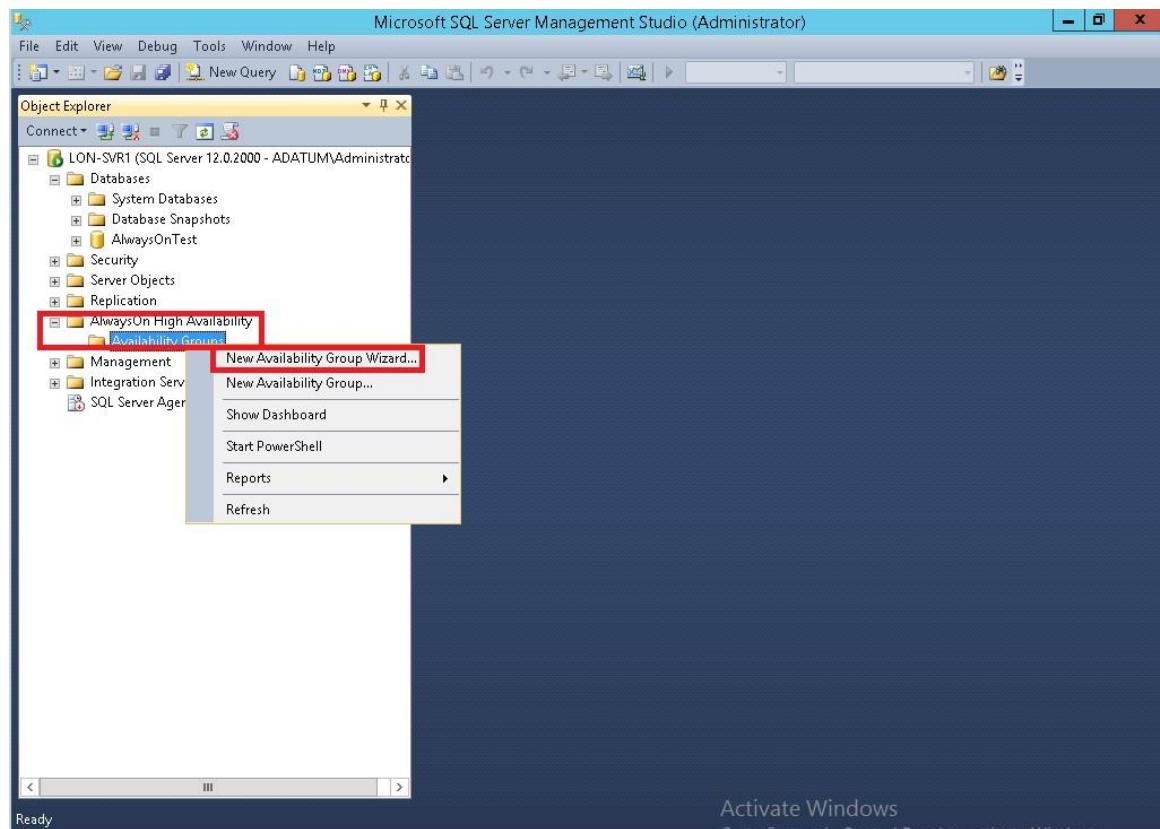


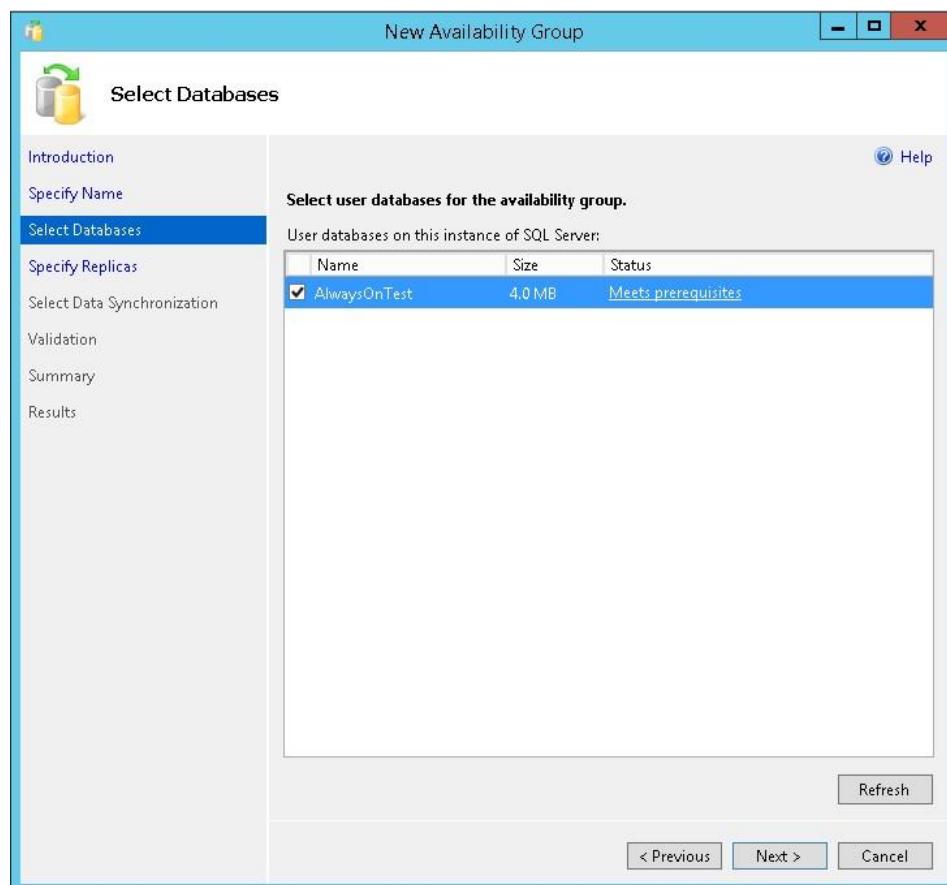
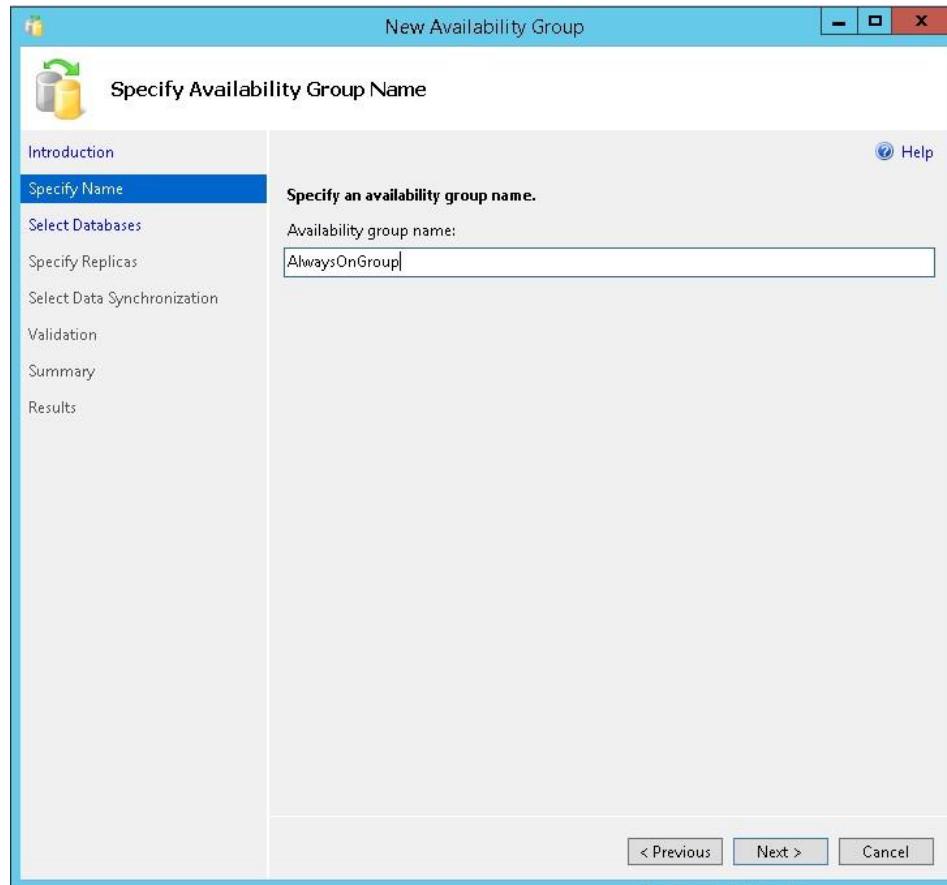


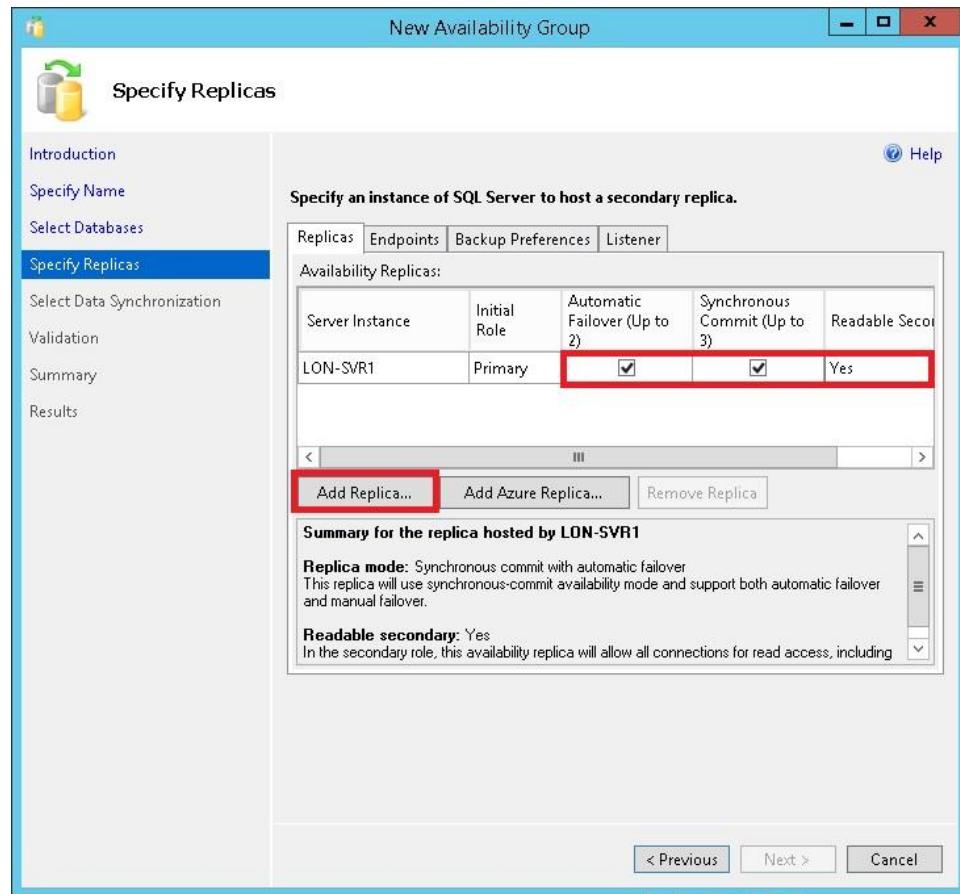
Slijedi konfiguracija SQL-a za korištenje AlwaysOn clusteringa. Potrebno je pokrenuti SQL 2014 Management Studio i ulogirati se kao administrator, te slijediti ove korake:

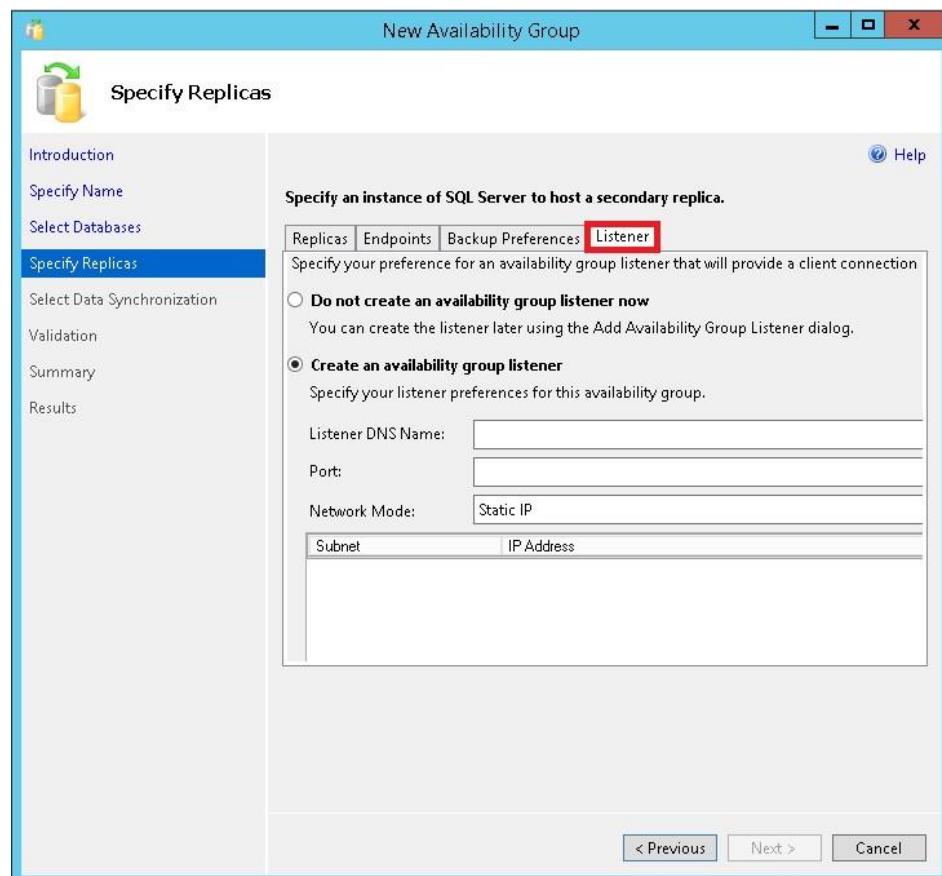
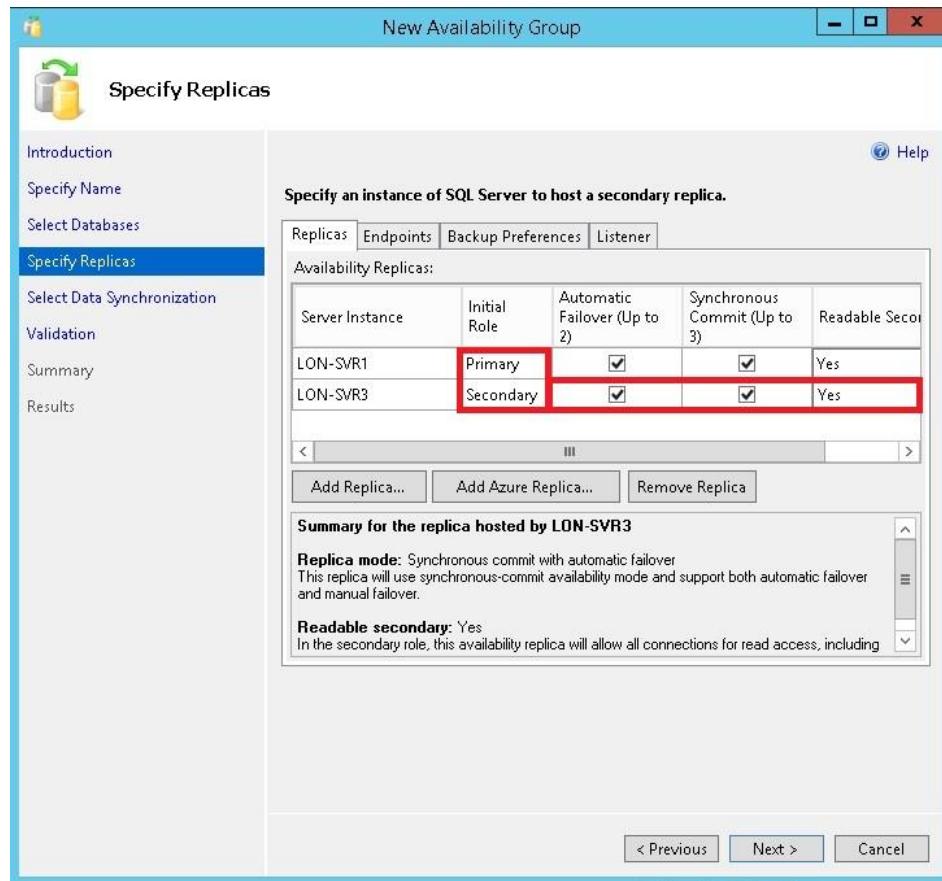














New Availability Group

### Specify Replicas

Specify an instance of SQL Server to host a secondary replica.

Replicas Endpoints Backup Preferences Listener

Specify your preference for an availability group listener that will provide a client connection point:

Do not create an availability group listener now  
You can create the listener later using the Add Availability Group Listener dialog.

Create an availability group listener  
Specify your listener preferences for this availability group.

Listener DNS Name: AlwaysListener

Port: 5023

Network Mode: Static IP

Subnet IP Address

Add... Remove

**Povećati prozor kako bi "Add" button postao vidljiv!**

Activate Windows

Add IP Address

Subnet 131.107.0.0/16

Address

IPv4 Address

Subnet Mask 255.255.0.0

IPv6 Address

OK Cancel Help



Add IP Address

Subnet	172.16.0.0/16
Address	
IPv4 Address	172.16.0.242
Subnet Mask	255.255.0.0
IPv6 Address	

OK Cancel Help

New Availability Group

### Select Initial Data Synchronization

Introduction      Select Data Synchronization      Validation      Summary      Results

Select your data synchronization preference.

**Full**  
Starts data synchronization by performing full database and log backups for each selected database. These databases are restored to each secondary and joined to the availability group.

**Join only**  
Starts data synchronization where you have already restored database and log backups to each secondary server. The selected databases are joined to the availability group on each secondary. This action will be skipped for Azure replicas.

**Skip initial data synchronization**  
Choose this option if you want to perform your own database and log backups of each primary database.

\\\lon-dc1\\AlwaysOnShare|

< Previous    Next >    Cancel



New Availability Group

### Validation

Introduction  
Specify Name  
Select Databases  
Specify Replicas  
Select Data Synchronization  
**Validation**  
Summary  
Results

Help

**Results of availability group validation.**

Name	Result
Checking whether the endpoint is encrypted using a compatible algorithm	Success
Checking shared network location	Success
Checking for free disk space on the server instance that hosts secondary re...	Success
Checking if the selected databases already exist on the server instance that ...	Success
Checking for compatibility of the database file locations on the server insta...	Success
Checking for the existence of the database files on the server instance that ...	Success
Checking the listener configuration	Success
Checking the availability mode compatibility between the primary and sec...	Success

Re-run Validation

< Previous Next > Cancel

New Availability Group

### Summary

Introduction  
Specify Name  
Select Databases  
Specify Replicas  
Select Data Synchronization  
Validation  
**Summary**  
Results

Help

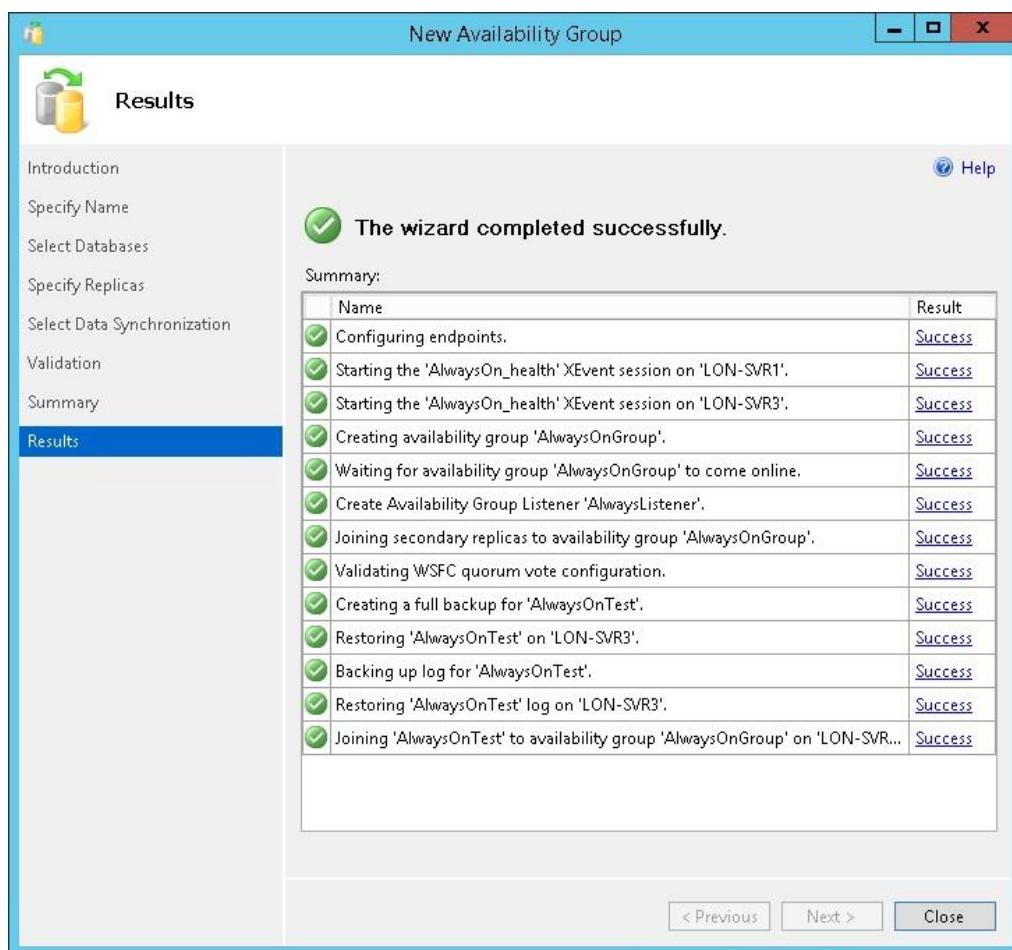
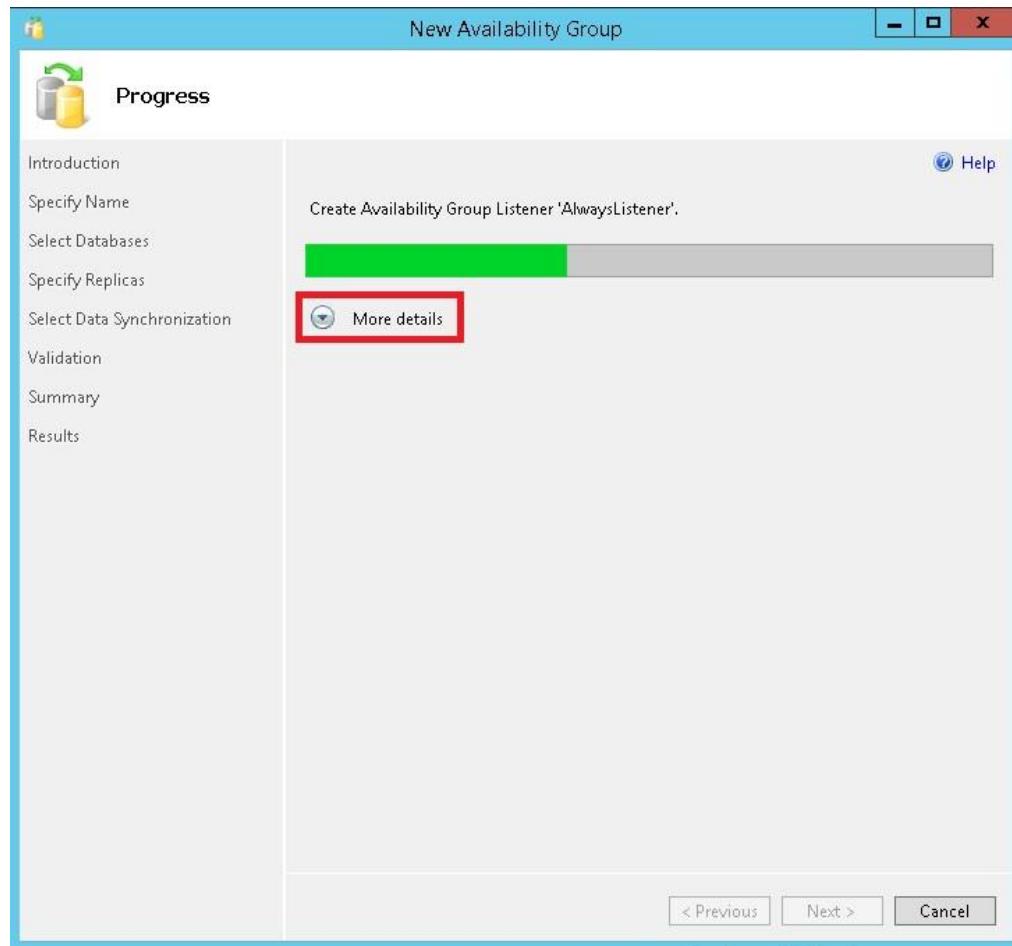
**Verify the choices made in this wizard.**

Click Finish to perform the following actions:

- Availability Group: AlwaysOnGroup
  - Primary replica: LON-SVR1
  - Availability Group Listener: AlwaysListener
  - Automated backup preference: Secondary
- Databases
  - AlwaysOnTest (4.0 MB)
  - Initial data synchronization: Full
  - Backup location: \\lon-dc1\AlwaysOnShare
- Replicas
  - Server instance name: LON-SVR1
    - Role: Primary
    - Replica mode: Synchronous commit with automatic failover
    - Readable secondary: Yes
    - Endpoint: Hadr\_endpoint
      - URL: TCP://LON-SVR1.Adatum.com:5022
      - Encrypted: Yes
      - Service account: ADATUM\SQLAdmin
    - Automated backup priority: 50
  - Server instance name: LON-SVR3
    - Role: Secondary
    - Replica mode: Synchronous commit with automatic failover

Script

< Previous Finish Cancel





Krajnji rezultat trebao bi u Failover Clustering Manageru izgledati ovako:

