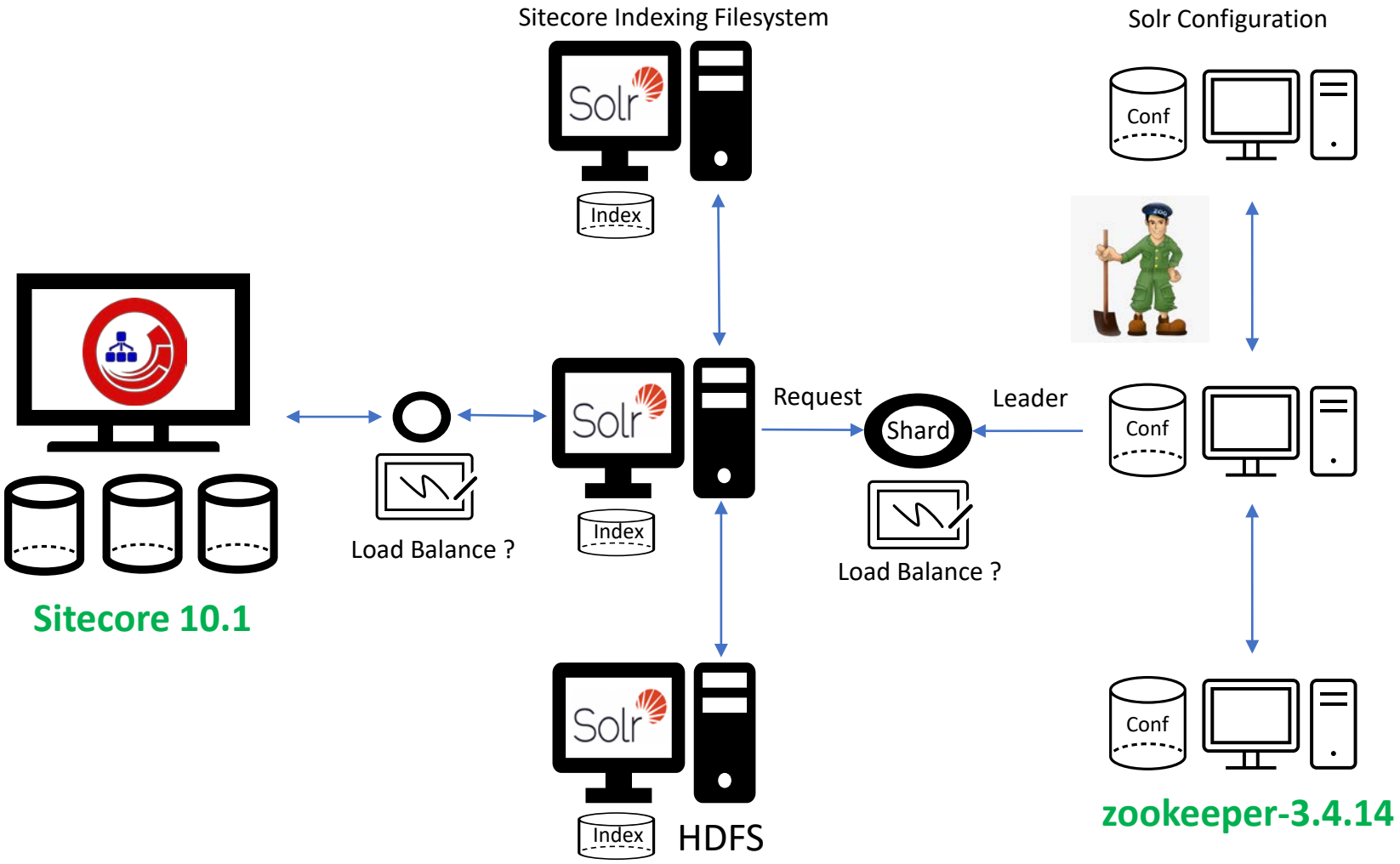
Reference :

Jeremy Davis : GitHub: https://github.com/jermdavis/SolrCloud-Helpers

Sitecore Solr compatibility table	: https://kb.sitecore.net/articles/227897
Solr Ref Guide 8.4 > SolrCloud	: https://solr.apache.org/guide/8_4/solrcloud.html
Solr archives	: https://archive.apache.org/dist/lucene/solr/
ZooKeeper releases	: https://archive.apache.org/dist/zookeeper/

General Diagram




Apache Accumulo
Flume
Apache S4
Solr
HBase
Apache HedWig
Kafka
Hadoop
ZOO
Apache Zookeeper

1. SolrCloud Installation Steps --- 6
   - Manual Upload configSets to SolrCloud --- 12
   - Solution 1: Run zkCli.bat to upload 'conf' to SolrCloud --- 17
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2. SolrCloud Admin --- 25
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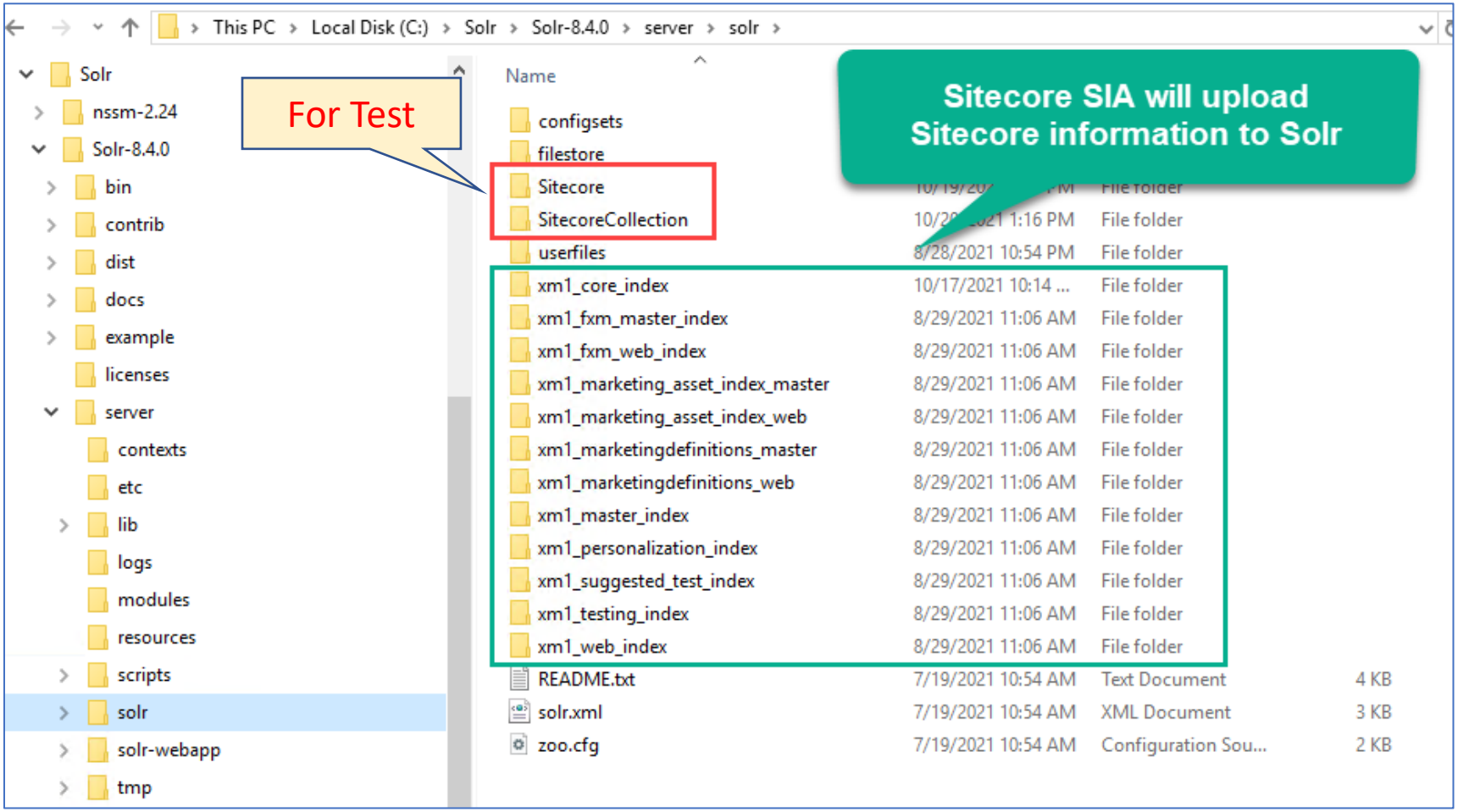
4. Compare SolrCloud Admin --- 32
5. SolrCloud Indexing & Query --- 37

Standalone Sitecore XM 10.1 Folder Structure

Solr 8.4.0 for Sitecore 10.1 XM on Prem



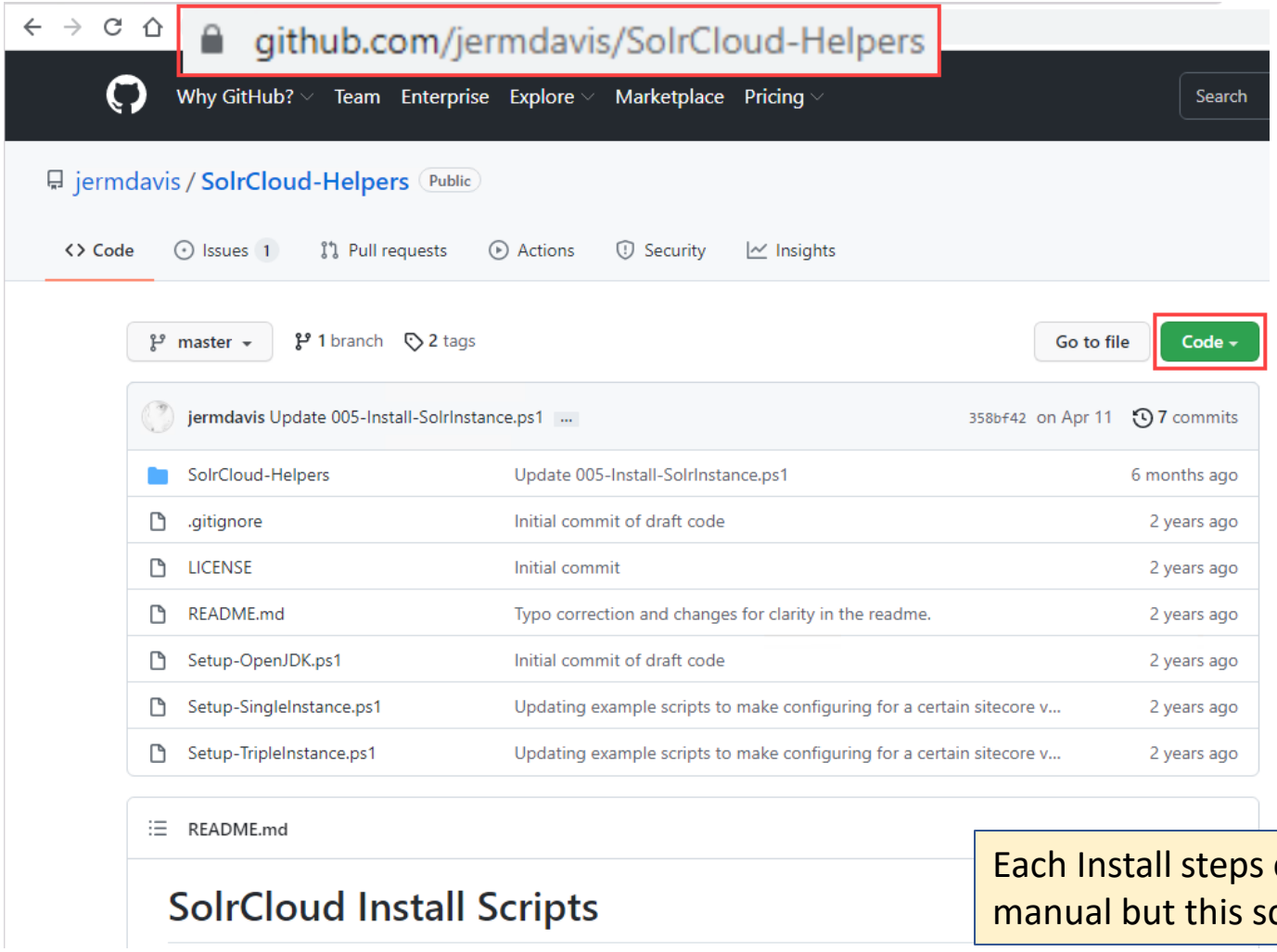
Sitecore Collection should be made to upload Sitecore information to **SolrCloud**

SolrCloud Installation Steps

1. Download all install scripts from “Jeremy Davis” Github
2. Set Server Environment Variables
   - JAVA_HOME
   - PATH
3. Download & Install Java Runtime Environment
4. Download & Install NSSM to Make Service
5. Download & Install ZooKeeper Instance
6. Creates Certification for Solr Service
7. Configure ZooKeeper
8. Configure Solr
9. Create SolrConfigSet(Sitecore Collections) from Sitecore Site
10. Upload Sitecore Collections to Solr

Download Install Scripts

Download and Unzip



Each Install steps can be installed by manual but this script makes easier

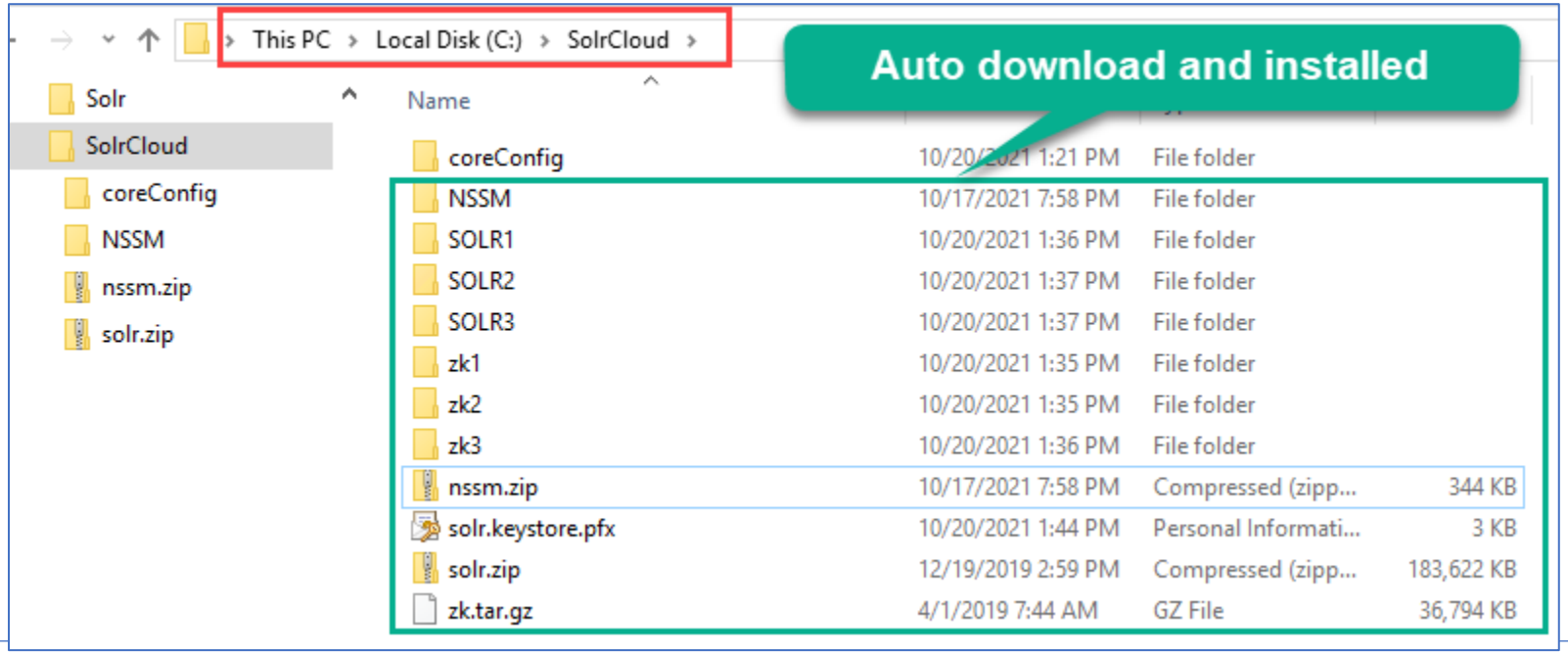
Create “SolrCloud” Folder on Server

Prepare SolrCloud Folder Structure : You may download necessary software & Install

You can use any folder name but match to script

C:\SolrCloud

- “coreConfig”
  - ✓ Create this folder and Later, **You will need put Sitecore ConfigSet zip file to here**
  - ✓ I have changed the original script to understand easier and show how it works
- NSSM : Script will download & Install if file does not exist



Run script Using PowerShell

Run on VS Code

Setup-TripleInstance.ps1 > ...

```
10  $targetFolder = "c:\SolrCloud"
11  $installService = $true
12  $collectionPrefix = "search"
13  #$collectionPrefix = "xm1"
14  #$solrPackage = "https://archive.apache.org/dist/lucene/solr/7.2.1/solr-7.2.1.zip" # For Sitecore v9.1
15  #$solrPackage = "https://archive.apache.org/dist/lucene/solr/7.5.0/solr-7.5.0.zip" # For Sitecore v9.2
16  #$solrPackage = "https://archive.apache.org/dist/lucene/solr/8.1.1/solr-8.1.1.zip" # For Sitecore V9.3
17  $solrPackage = "https://archive.apache.org/dist/lucene/solr/8.4.0/solr-8.4.0.zip" # For Sitecore v10.1
18  $zkPackage = "https://archive.apache.org/dist/zookeeper/zookeeper-3.4.14/zookeeper-3.4.14.tar.gz";
19
20
21  $zkData = @(
22      @{Host = "localhost"; Folder = "zk1"; InstanceID = 1; ClientPort = 2971; EnsemblePorts = "2981:2991" },
23      @{Host = "localhost"; Folder = "zk2"; InstanceID = 2; ClientPort = 2972; EnsemblePorts = "2982:2992" },
24      @{Host = "localhost"; Folder = "zk3"; InstanceID = 3; ClientPort = 2973; EnsemblePorts = "2983:2993" }
25  )
26
27  $solrData = @(
28      @{Host = "solr1"; Folder = "SOLR1"; ClientPort = 9991 },
29      @{Host = "solr2"; Folder = "SOLR2"; ClientPort = 9992 },
30      @{Host = "solr3"; Folder = "SOLR3"; ClientPort = 9993 }
31  )
32
```

You can change port number or others

PROBLEMS 5 OUTPUT DEBUG CONSOLE TERMINAL PowerShell Integrated Console

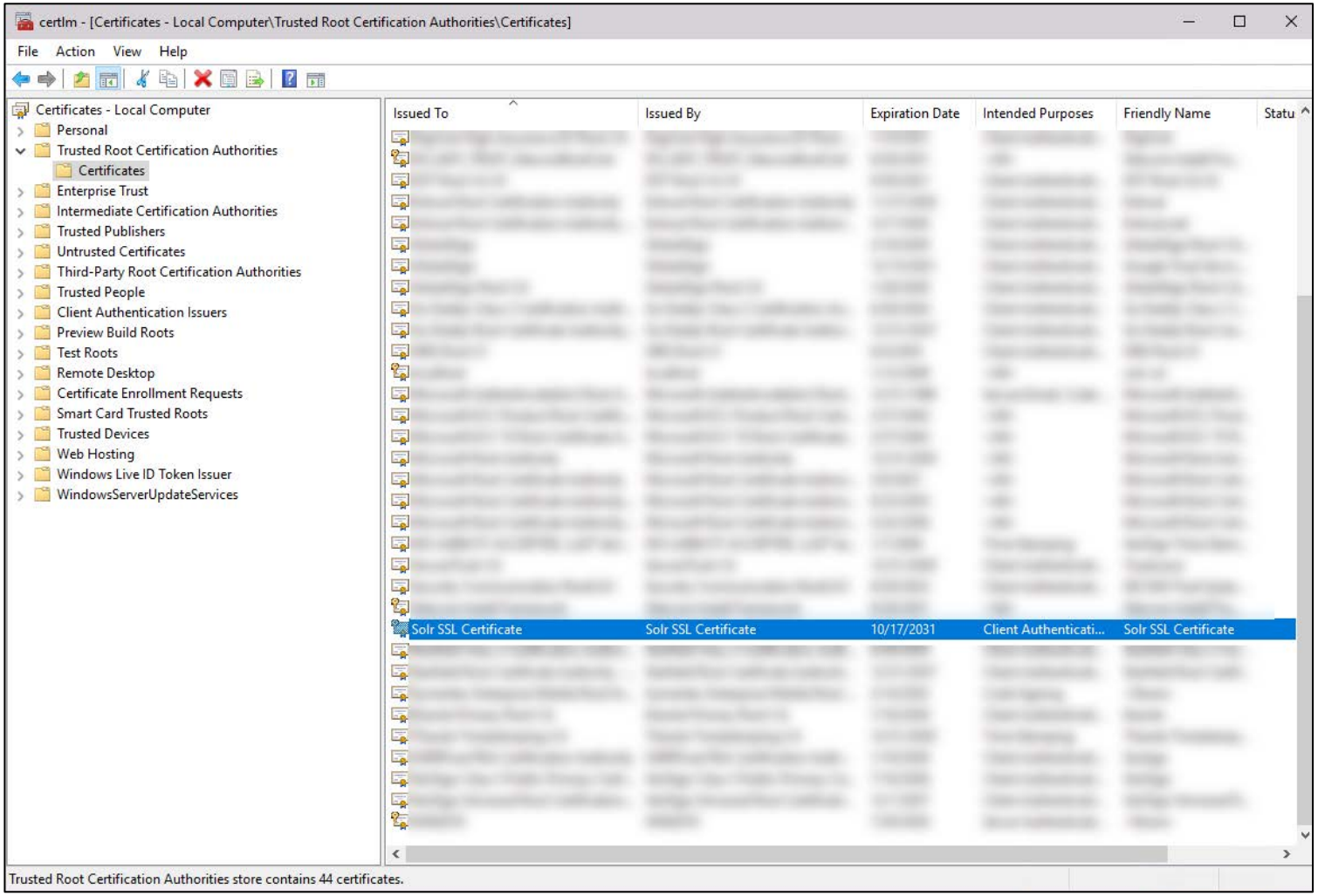
```
=====> PowerShell Integrated Console v2021.10.1 <=====

PS D:\SolrCloud Install> .\Setup-TripleInstance.ps1

Folder c:\SolrCloud exists
No need to download NSSM - already present...
No need to extract nssm - it already exists
Folder c:\SolrCloud exists
No need to download ZooKeeper - already present...
No need to extract ZooKeeper - it already exists
Instance id file exists.
ZooKeeper config file exists
ZooKeeper service ZooKeeper-1 already exists.
Folder c:\SolrCloud exists
No need to download ZooKeeper - already present...
No need to extract ZooKeeper - it already exists
Instance id file exists.
```

Hosts

```
28  127.0.0.1   localhost
29  127.0.0.1
30
31  127.0.0.1   xm1identityserver.dev.local
32  127.0.0.1   xm1cm.dev.local
33  127.0.0.1   xm1cd.dev.local
34
35  127.0.0.1   solr1   solr2   solr3
```

Install Certification

Install Solr SSL Certificate using MMC



Run script Using PowerShell

1. Comment out “SolrCollection” Procress
   - Go to Install Folder (D:\SolrCloud Install)
   - **Run “.\Setup-TripleInstance.ps1”**

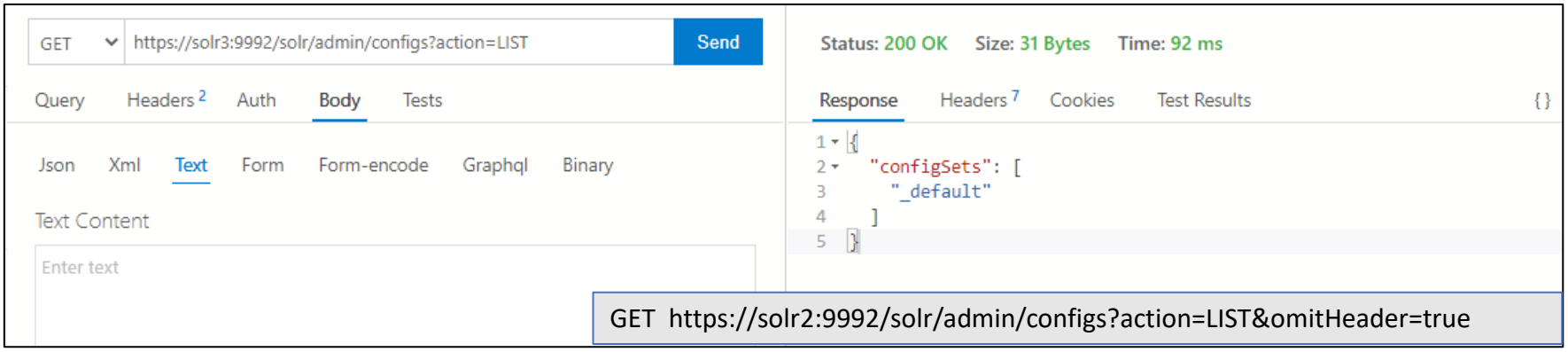
SolrCloud-Helpers > Install > 007-Configure-SolrCollections.ps1 > ...

```
254
255     foreach($core in $sitecoreCores)
256     {
257         Create-SolrCollection $solrHostname $solrClientPort $core "Sitecore" -shards $shards -replicas $replicas -shardsP
258     }
259
260     $xDbCores = @(
261         "$($collectionPrefix)_xdb",
262         "$($collectionPrefix)_xdb_rebuild"
263     )
264
265     foreach($core in $xDbCores)
266     {
267         Create-SolrCollection $solrHostname $solrClientPort "$($core)_internal" "xDB" -shards $shards -replicas $replicas
268         Create-SolrCollectionAlias $solrHostname $solrClientPort "$($core)_internal" $core
269     }
270 }
271 <#
272 Export-ModuleMember -Function Configure-SolrCollection
273 #>
274
275
```

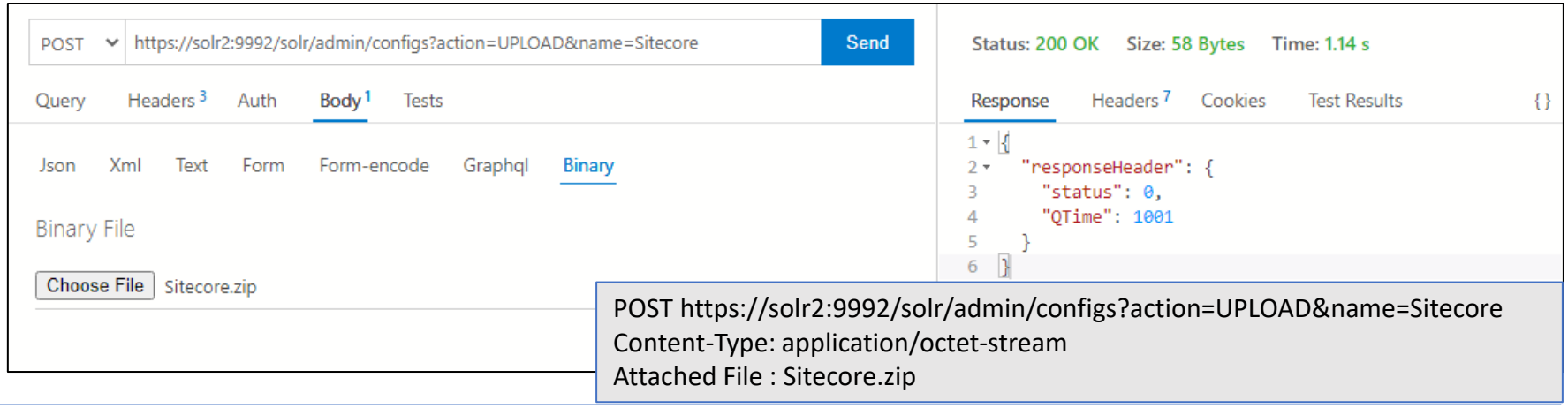
2. When installation is stopped, Check all software, folder creation and Server is running

Run script Using PowerShell

3. Manual Upload **configSets** to SolrCloud

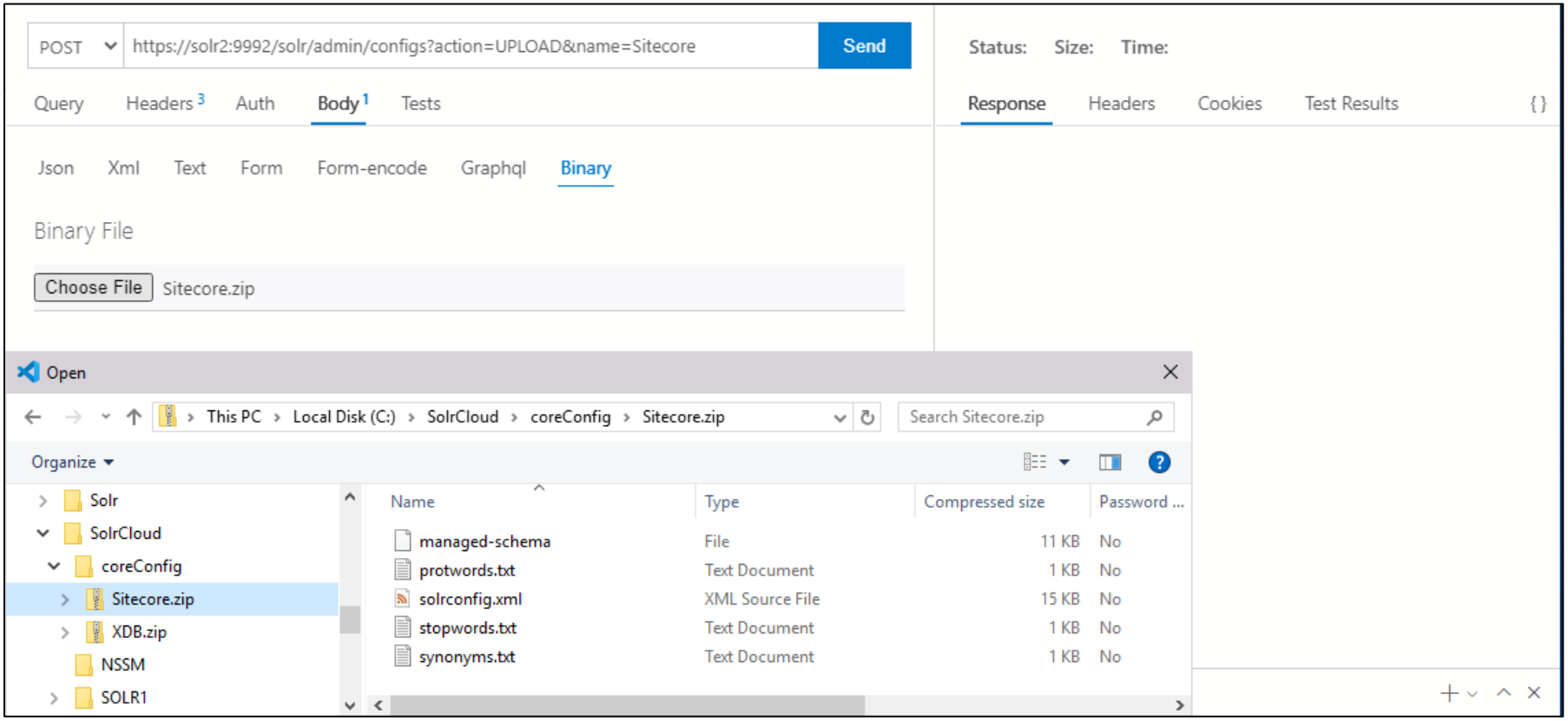


4. Manual Upload ConfigSet “Sitecore.zip” to SolrCloud (when Authentication is Trusted)



Run script Using PowerShell

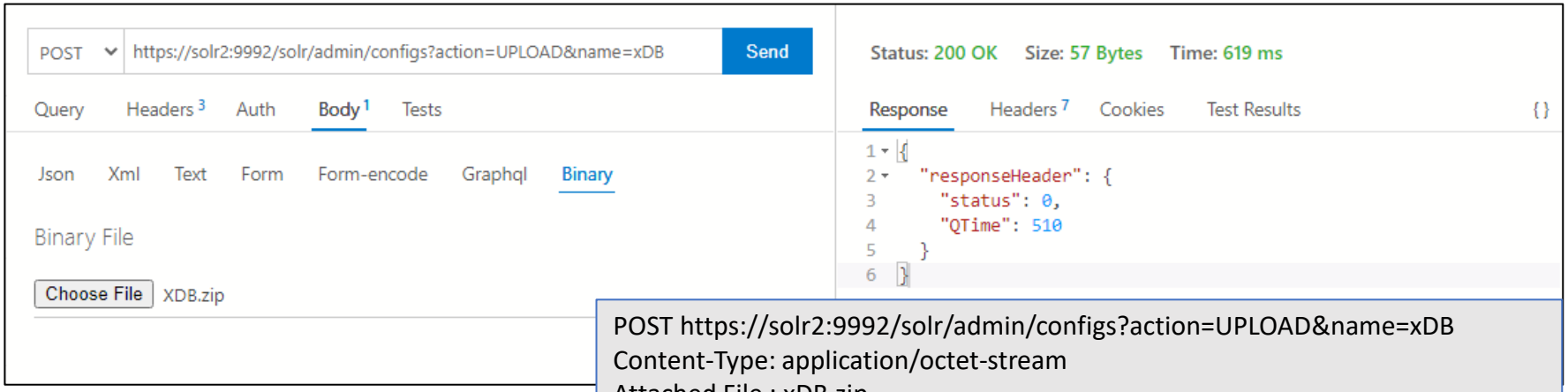
4. Manual Upload ConfigSet “Sitecore.zip” to SolrCloud (when Authentication is Trusted)



POST https://solr2:9992/solr/admin/configs?action=UPLOAD&name=Sitecore
Content-Type: application/octet-stream
Attached File : Sitecore.zip

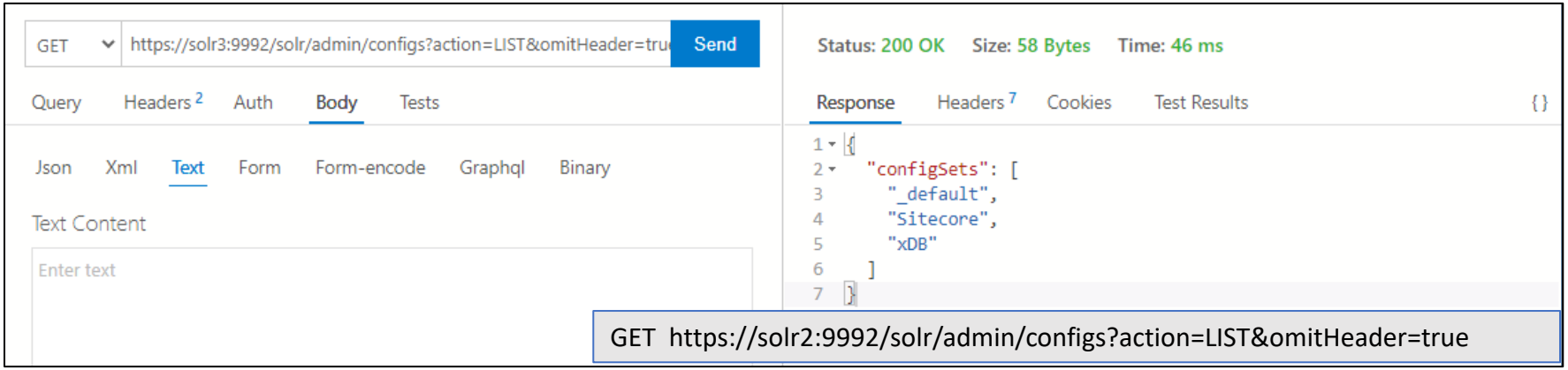
Run script Using PowerShell

5. Manual Upload ConfigSet “xDB.zip” to SolrCloud (when Authentication is Trusted)



POST https://solr2:9992/solr/admin/configs?action=UPLOAD&name=xDB
Content-Type: application/octet-stream
Attached File : xDB.zip

6. Verify configSets Content



GET https://solr2:9992/solr/admin/configs?action=LIST&omitHeader=true

Run script Using PowerShell

7. Remove Comment and Run script again

SolrCloud-Helpers > Install > 007-Configure-SolrCollections.ps1 > ...

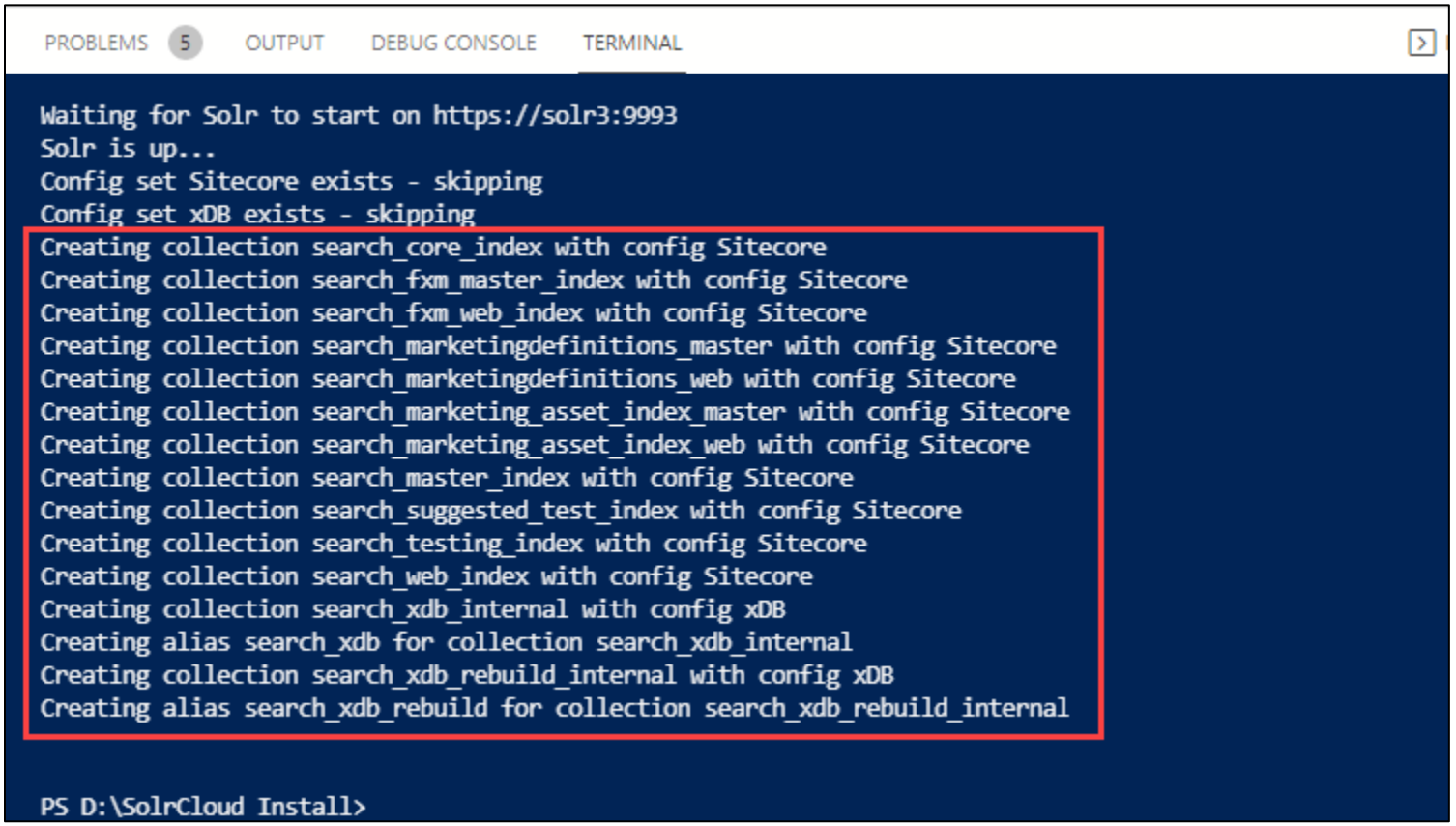
```
264
265     foreach($core in $xDbCores)
266     {
267         Create-SolrCollection $solrHostname $solrClientPort "$($core)_internal" "xDB" -shards $shards -replica
268         Create-SolrCollectionAlias $solrHostname $solrClientPort "$($core)_internal" $core
269     }
270 }
271
272 Export-ModuleMember -Function Configure-SolrCollection
273
```

Configure-SolrCollection :

- Create Collection using predefined Collection Names
- Load it to one of SolrCloud node

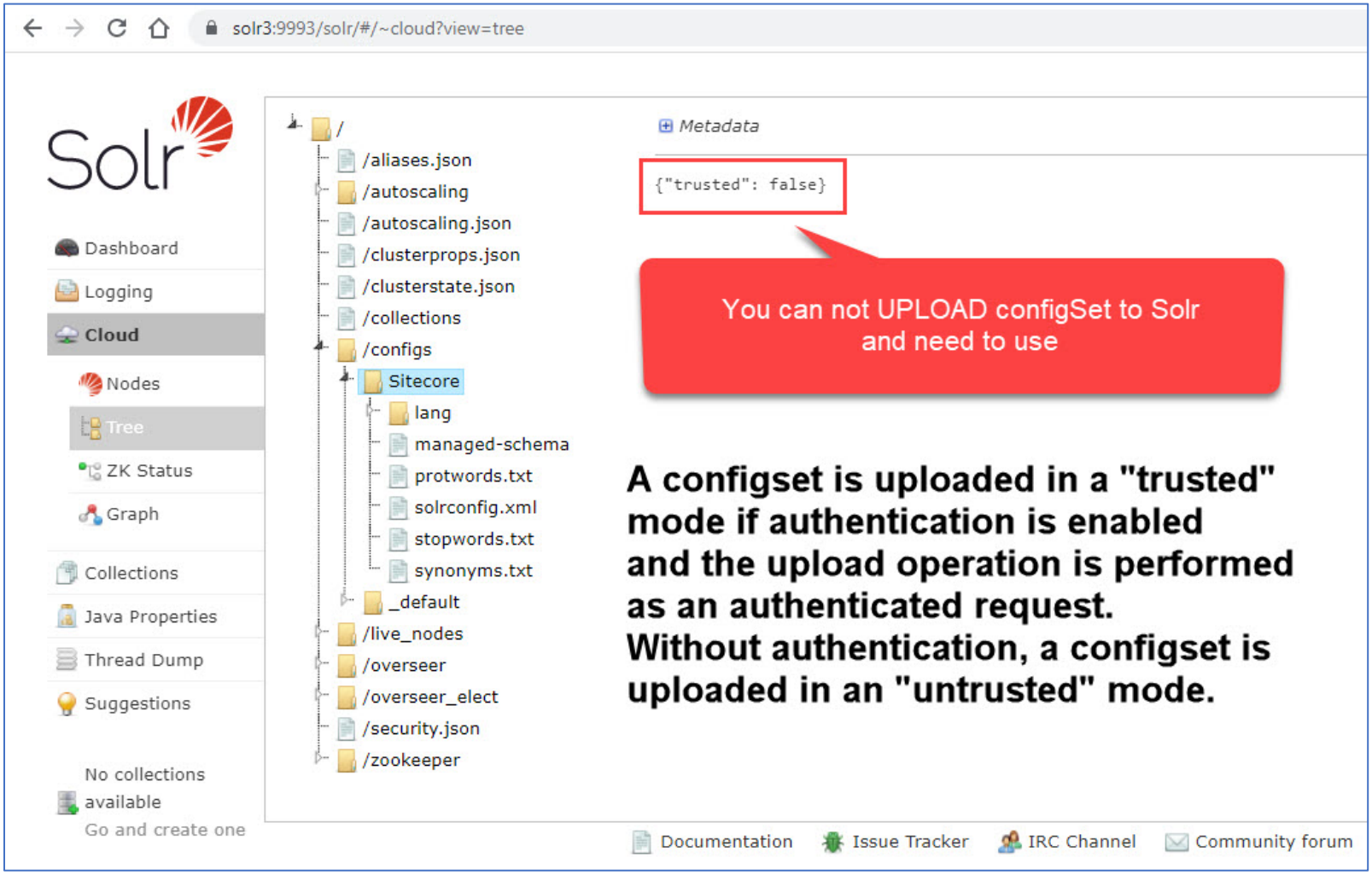
Run script Using PowerShell

8. Sitecore Collections are Uploaded



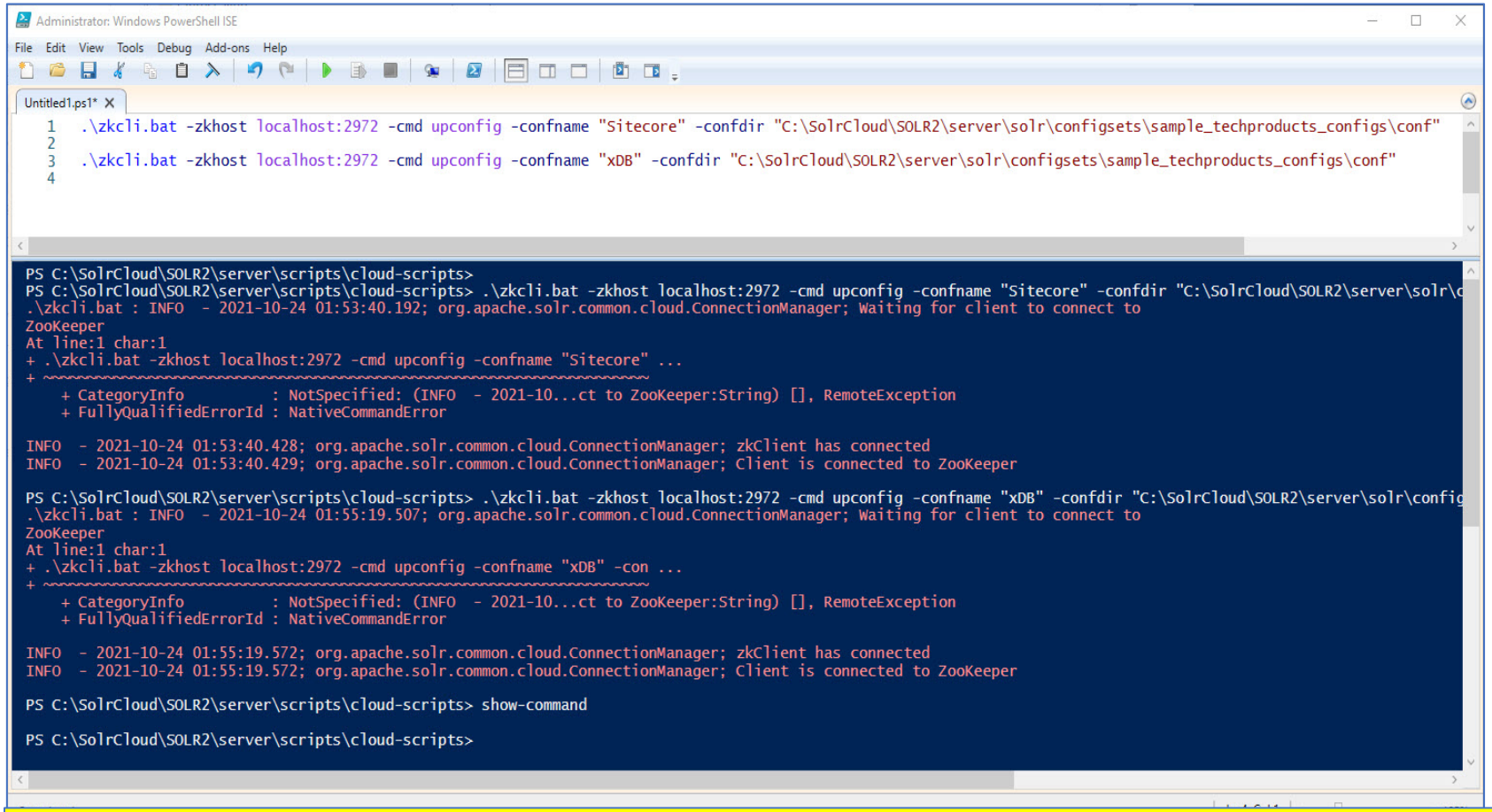
Solution 1: Run **zkCli.bat to upload 'conf'** to SolrCloud

On "Untrusted mode", You will use zkCli.bat (when 'security.json' is not used)



Solution 1: Run **zkCli.bat to upload 'conf'** to SolrCloud

On "Untrusted mode", You will use zkCli.bat




```
C:\SolrCloud\SOLR2\server\scripts\cloud-scripts>
.\zkcli.bat -zkhost localhost:2972 -cmd upconfig -confname "Sitecore" -confdir "C:\SolrCloud\coreConfig\conf"
.\zkcli.bat -zkhost localhost:2972 -cmd upconfig -confname "xDB"      -confdir "C:\SolrCloud\coreConfig\conf"
```

Solution 2: Use **Authentication** and “security.json”

1. Prepare security.json

https://solr.apache.org/guide/6_6/basic-authentication-plugin.html#basic-authentication-plugin

Security.json

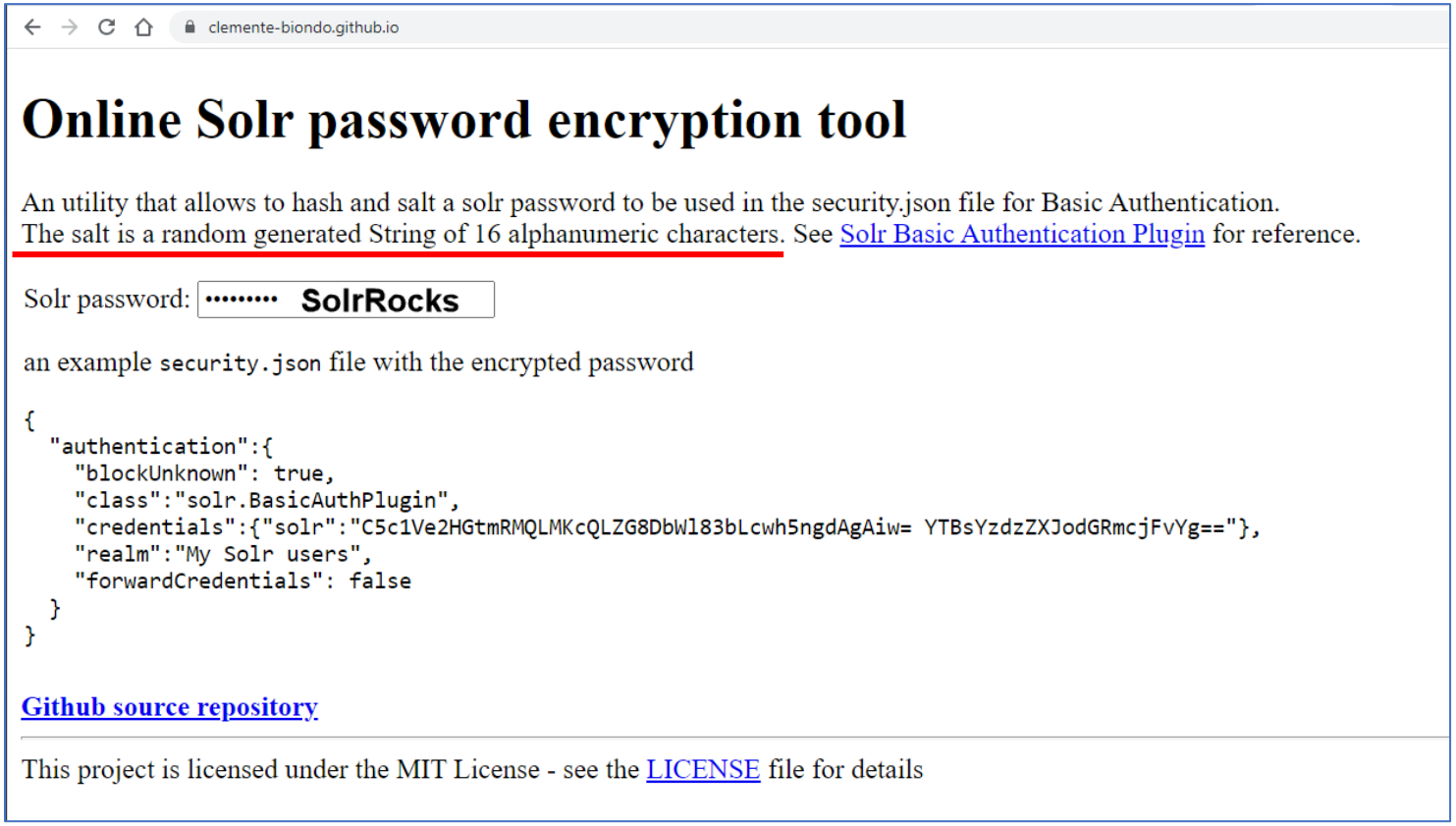
```
{
   "authentication":{
      "class":"solr.BasicAuthPlugin",
      "credentials":{
         "solr":"IV0EHq1OnNrj6gvRCwvFwTrZ1+z1oBbnQdiVC3otuq0= Ndd7LKvVBAaZIF0QAVi1ekCfAJXr1GGfLtRUXhgrF8c=“
      }
},
   "authorization":{
      "class":"solr.RuleBasedAuthorizationPlugin",
      "permissions":[{"name":"security-edit", "role":"admin"}],
      "user-role":{"solr":"admin"}
}}
```

2. Convert password to Base64

Source --> solr:SolrRocks
Result --> **c29scjpTb2xyUm9ja3M=**

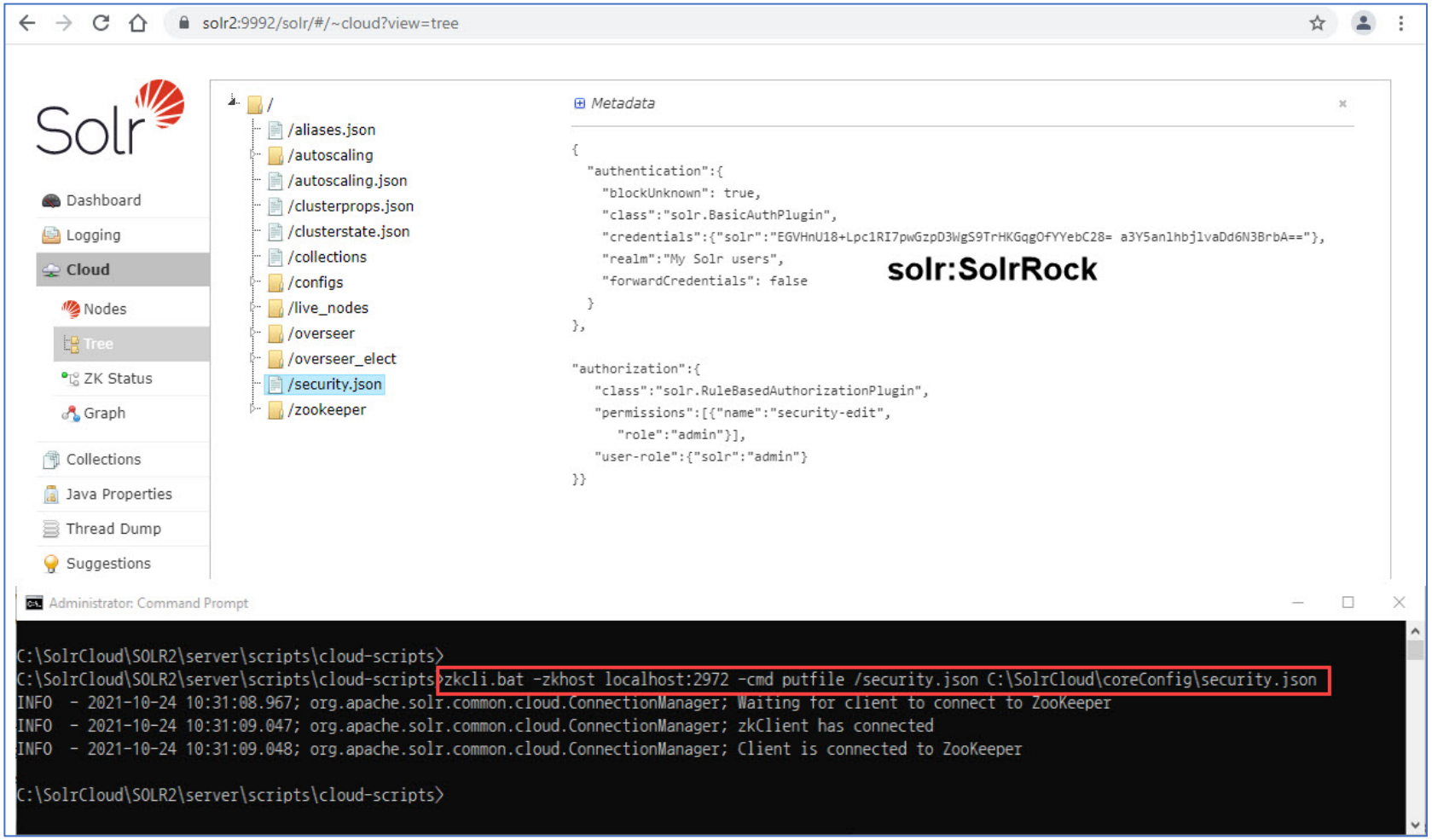
Solution 2: Use Authentication and “security.json”

Generates security.json Credentials - https://clemente-biondo.github.io/



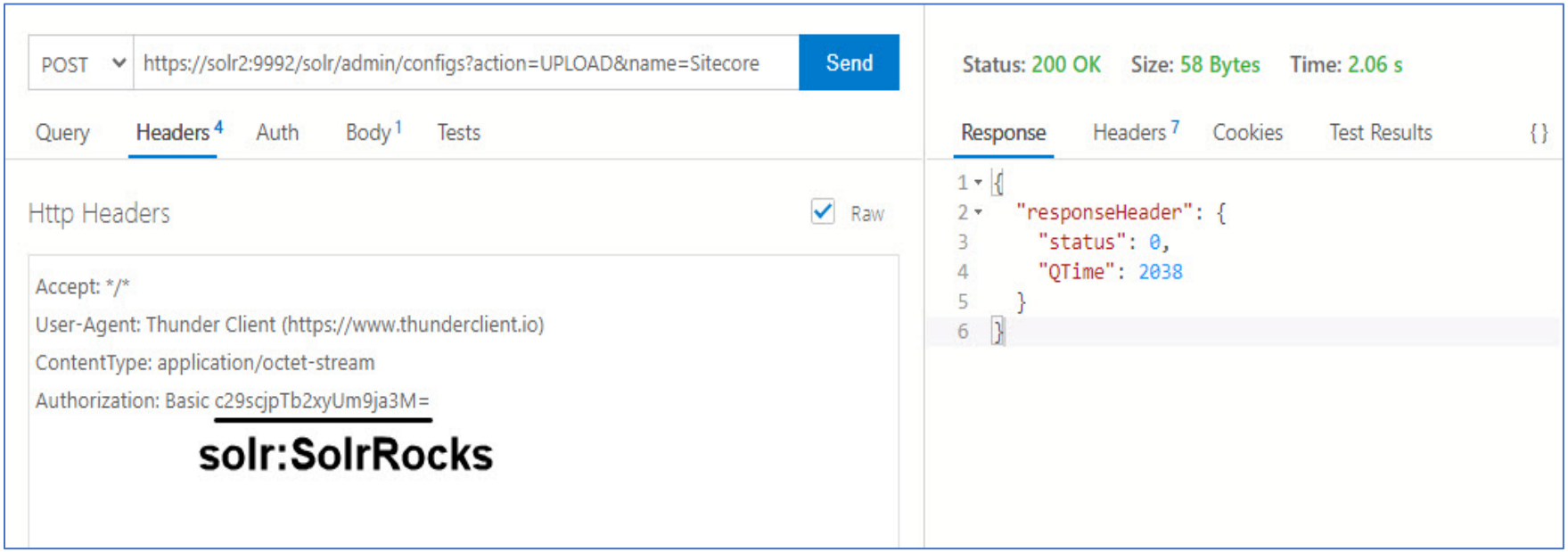
Solution 2: Use Authentication and “security.json”

2. Upload ‘security.json’ to SolrCloud



Solution 2: Use Authentication and “security.json”

3. Upload ‘Sitecore.zip’ with HTTP POST



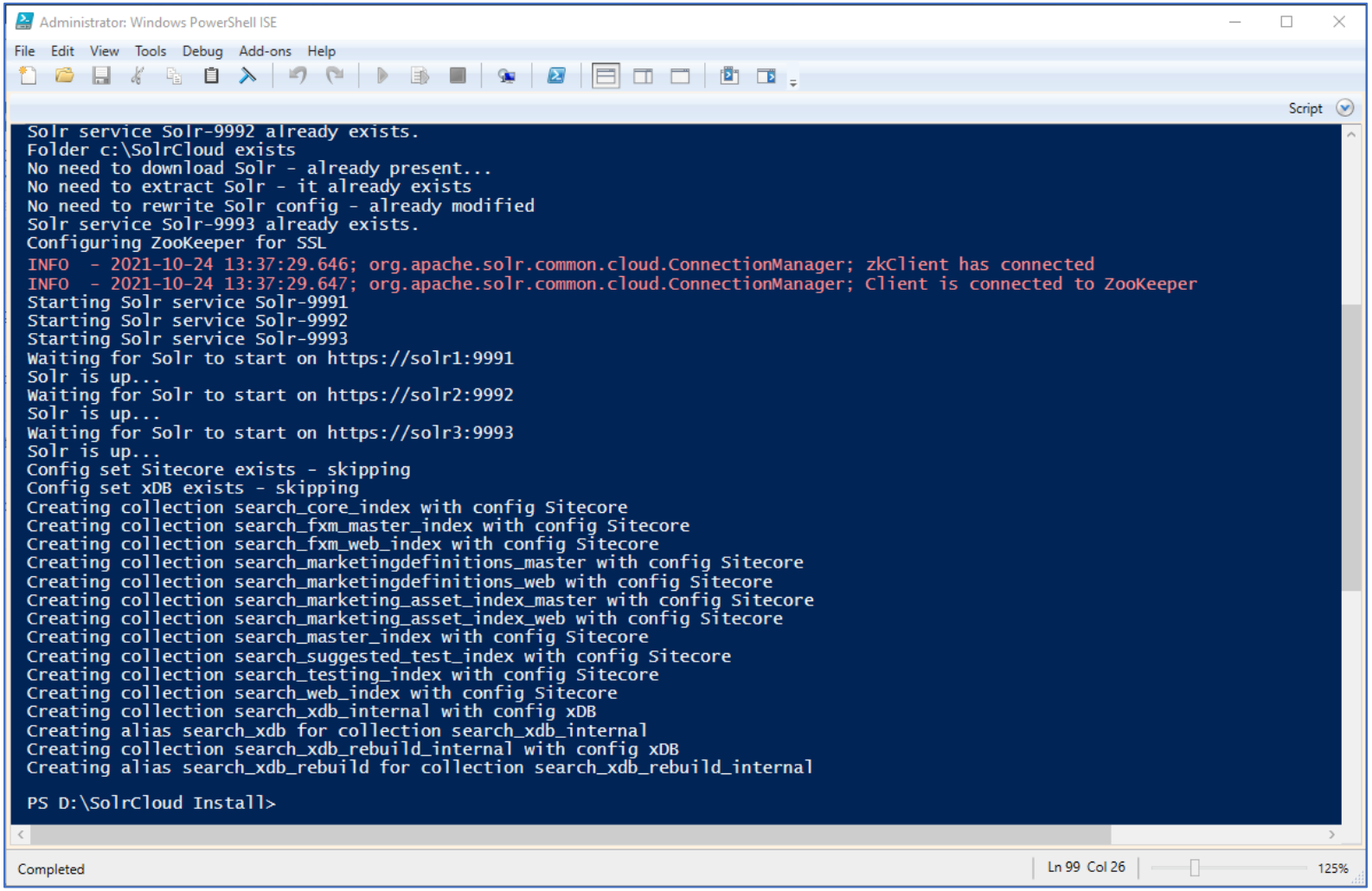
Convert ‘solr:SolrRocks’ to BASE64 ‘c29scjpTb2xyUm9ja3M=’

Solution 2: Use Authentication and “security.json”

3-1. Upload ‘Sitecore.zip’ with HTTP POST

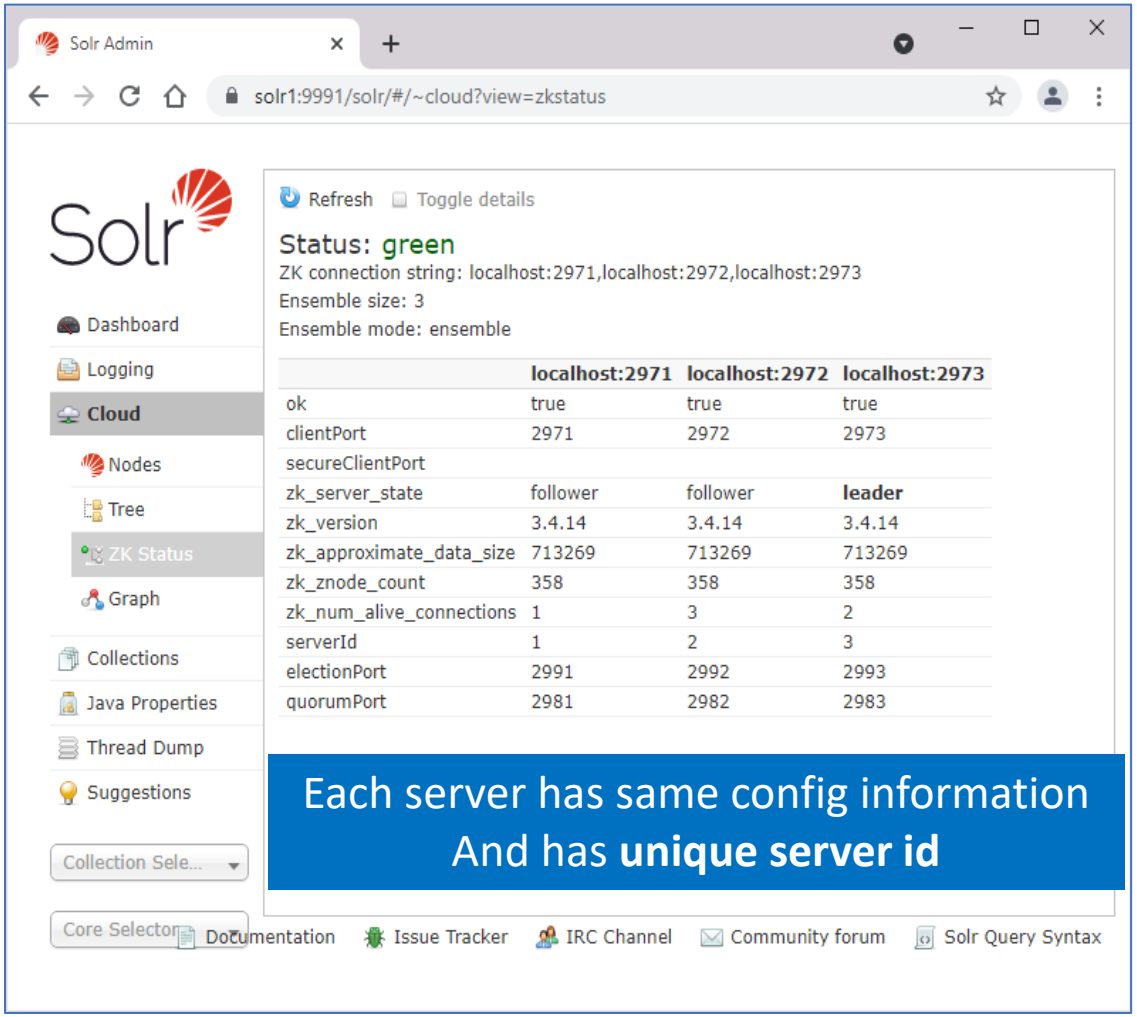
Solution 2: Use Authentication and “security.json”

4. Run script to Upload Collections (**Upload with Trusted**)



SolrCloud Admin

ZooKeeper Status – Leader and Follower (one ensemble has one leader and multiple follower)



	localhost:2971	localhost:2972	localhost:2973
ok	true	true	true
clientPort	2971	2972	2973
secureClientPort			
zk_server_state	follower	follower	**leader**
zk_version	3.4.14	3.4.14	3.4.14
zk_approximate_data_size	713269	713269	713269
zk_znode_count	358	358	358
zk_num_alive_connections	1	3	2
serverId	1	2	3
electionPort	2991	2992	2993
quorumPort	2981	2982	2983

Each server has same config information
And has **unique server id**

C:\SolrCloud\zk3\conf

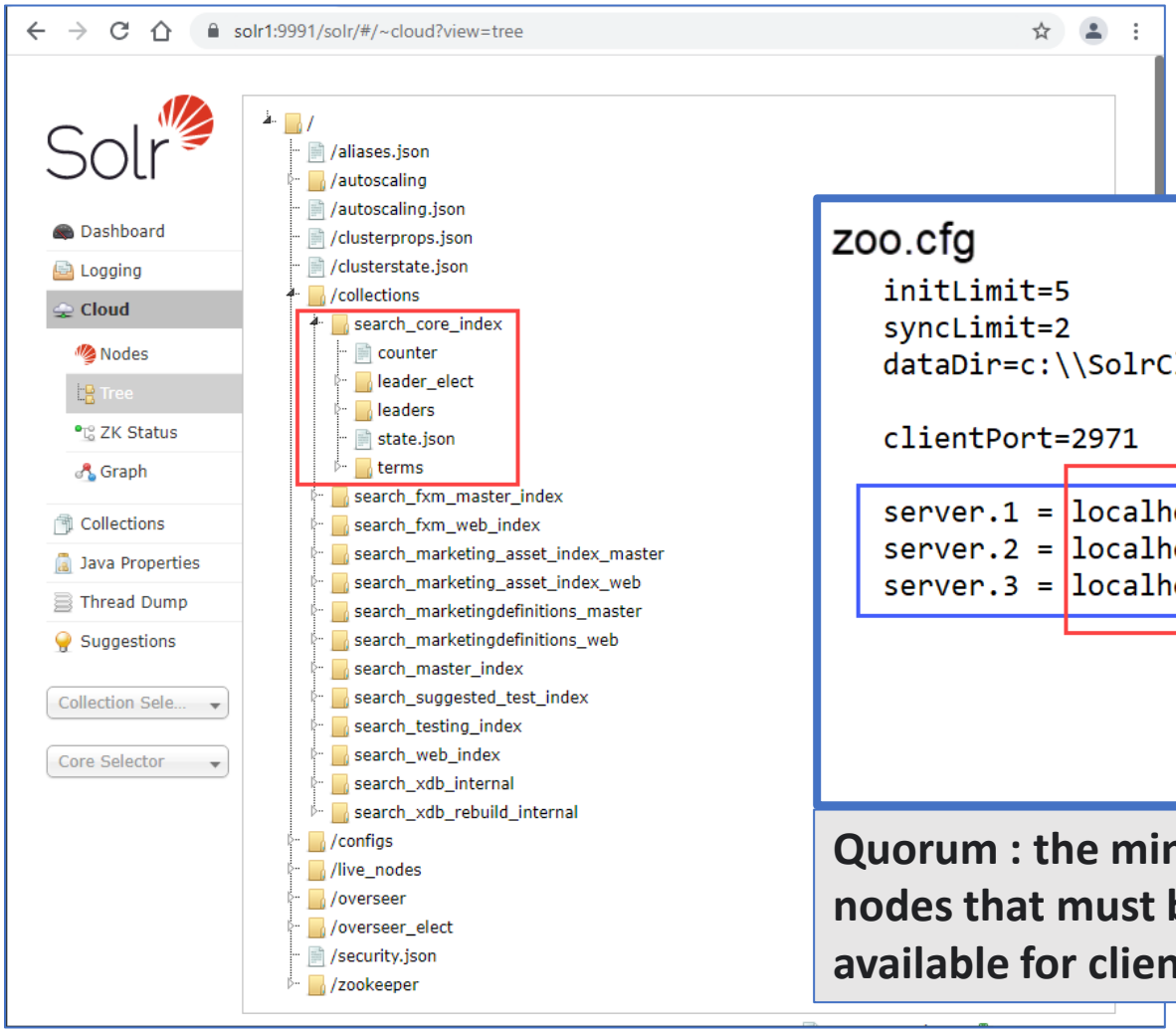
```
1 initLimit=5
2 syncLimit=2
3 dataDir=c:\\SolrCloud\\zk1\\data
4 clientPort=2971
5 server.1=localhost:2981:2991
6 server.2=localhost:2982:2992
7 server.3=localhost:2983:2993
```

```
1 initLimit=5
2 syncLimit=2
3 dataDir=c:\\SolrCloud\\zk2\\data
4 clientPort=2972
5 server.1=localhost:2981:2991
6 server.2=localhost:2982:2992
7 server.3=localhost:2983:2993
```

```
1 initLimit=5
2 syncLimit=2
3 dataDir=c:\\SolrCloud\\zk3\\data
4 clientPort=2973
5 server.1=localhost:2981:2991
6 server.2=localhost:2982:2992
7 server.3=localhost:2983:2993
```

SolrCloud Admin

Collections



zoo.cfg

```
initLimit=5
syncLimit=2
dataDir=c:\\SolrCloud\\zk1\\data

clientPort=2971

server.1 = localhost: 2981: 2991
server.2 = localhost: 2982: 2992
server.3 = localhost: 2983: 2993
```

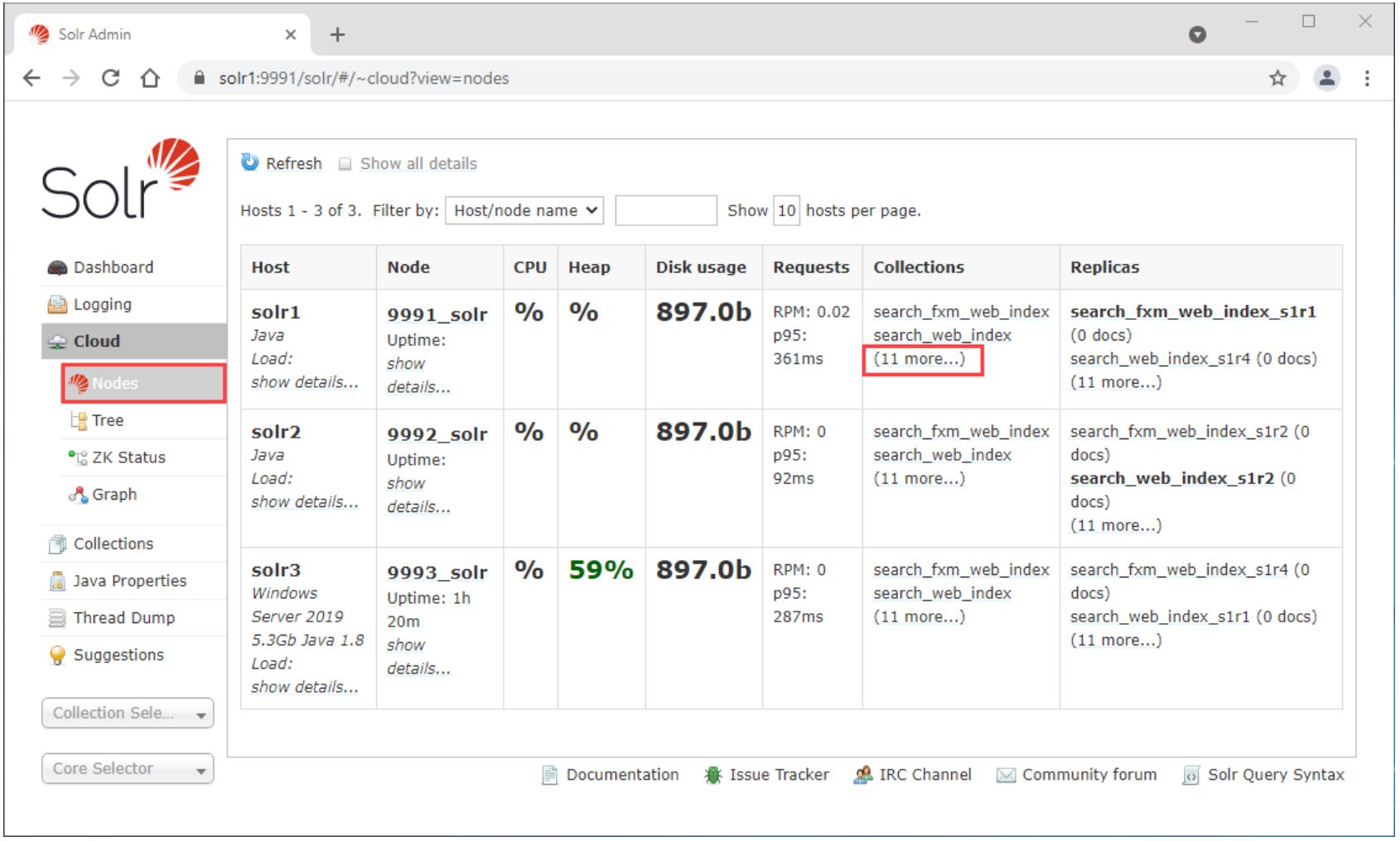
quorum count

Ensemble / Cluster count

Quorum : the minimum number of server nodes that must be up and running and available for client requests (>= 2)

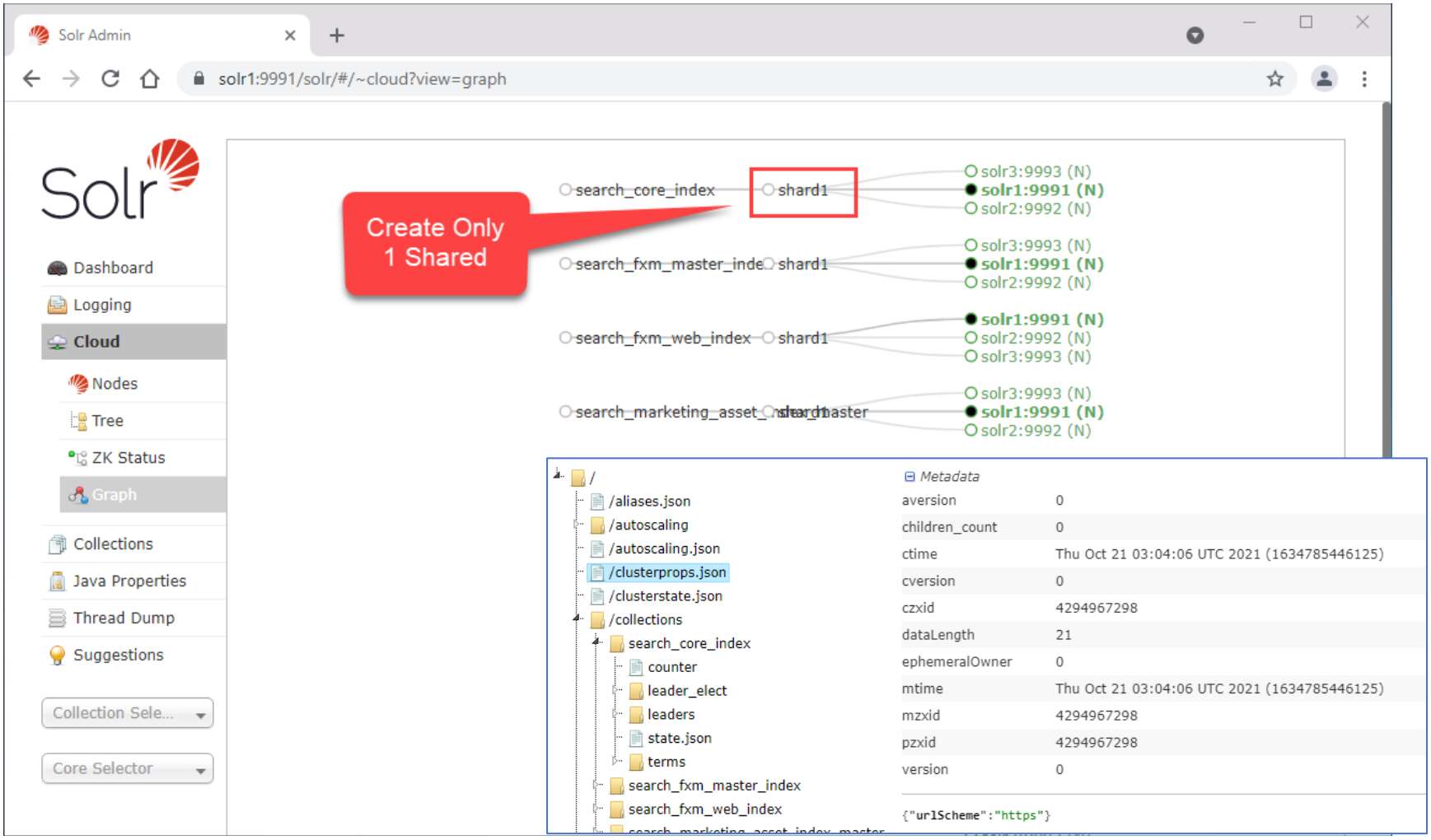
SolrCloud Admin

SolrCloud Nodes



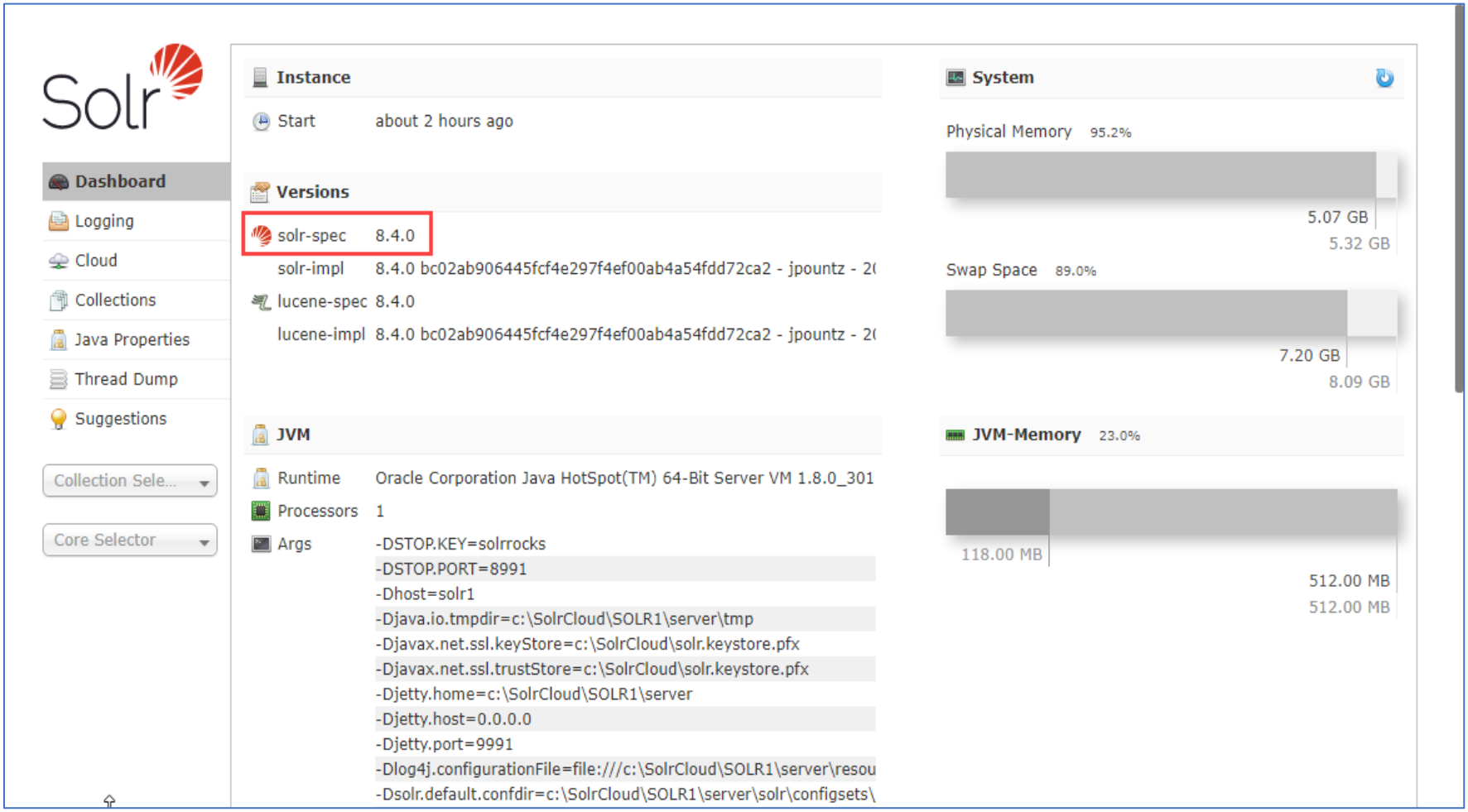
SolrCloud Admin

SolrCloud and Collections Mapping Graph



SolrCloud Admin

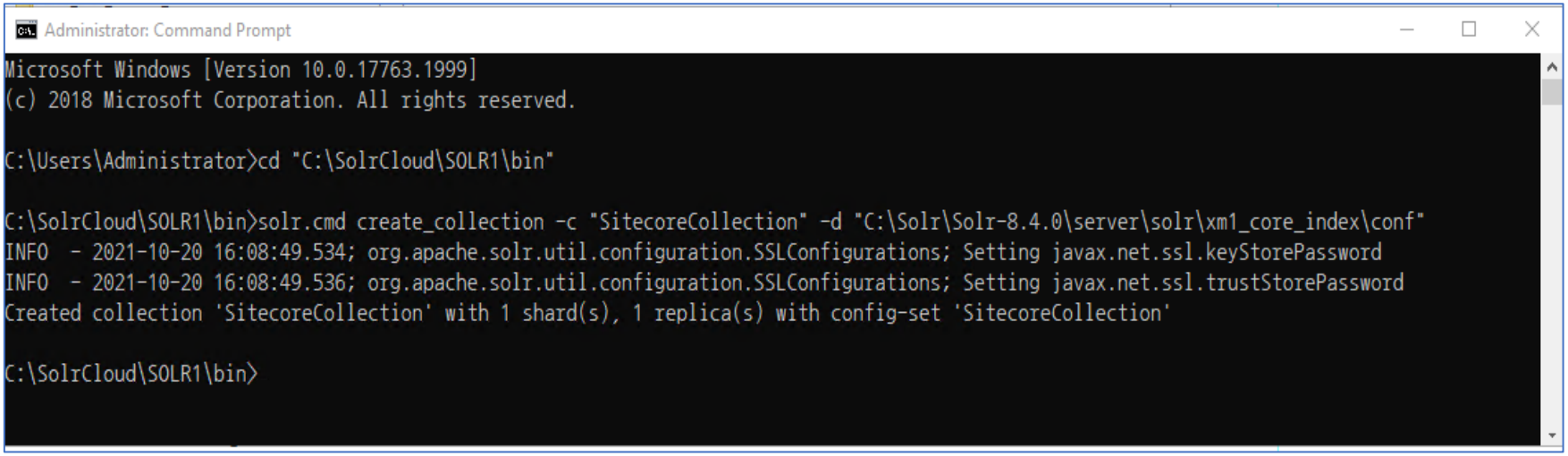
Dashboard



Create Sitecore Collection & Upload Automatically

SolrCloud require Sitecore Configuration file as Collection file and Upload it to ZooKeeper
http://www.mtitek.com/tutorials/solr/solr_cmd_create_collection.php#sec_id_4

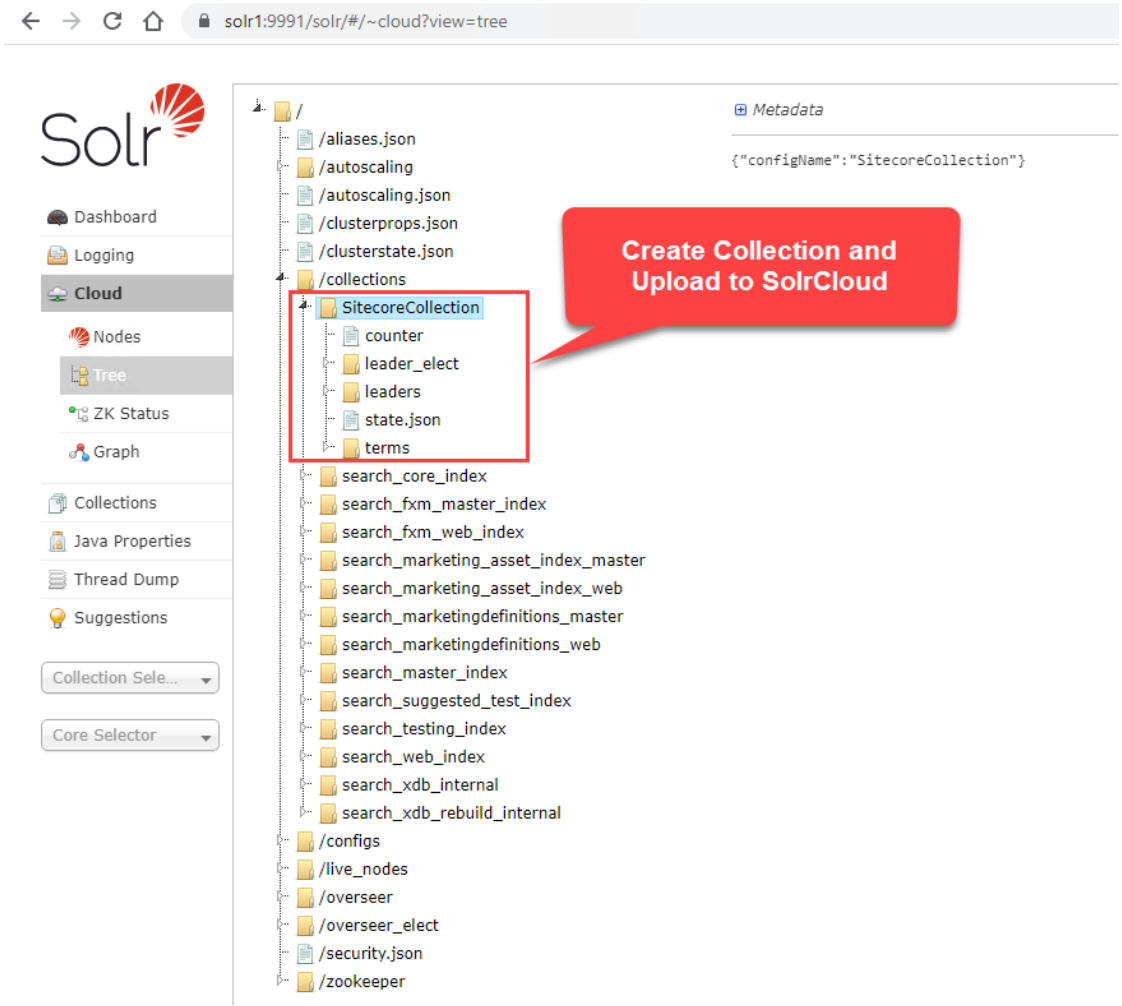
cd "C:\SolrCloud\SOLR1\bin"
C:\SolrCloud\SOLR1\bin\> solr.cmd create_collection -c "SitecoreCollection" -d "C:\Solr\Solr-8.4.0\server\solr\xm1_core_index\conf"



This will be used when you upload Collection to SolrCloud by manual
Once Collection uploaded then it will be distributes to the other servers and ZooKeeper

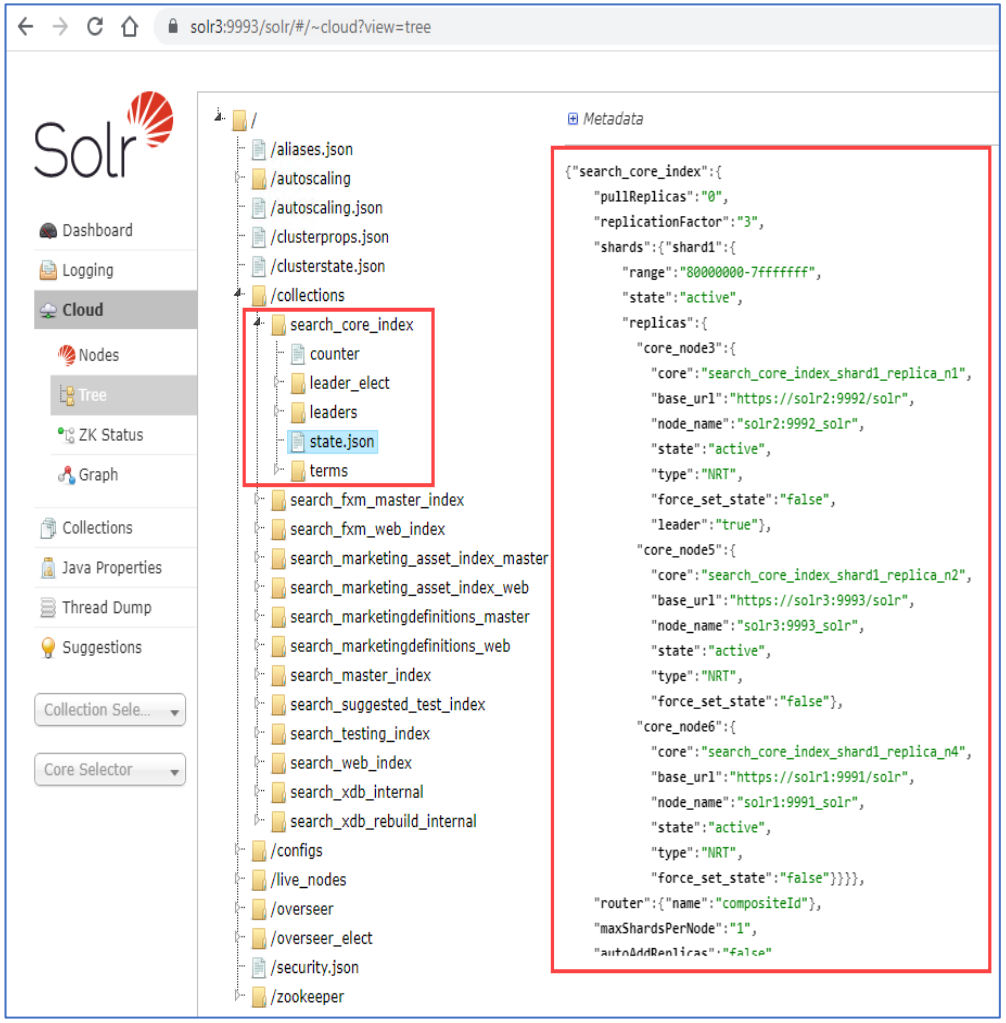
Create Sitecore Collection & Upload Automatically

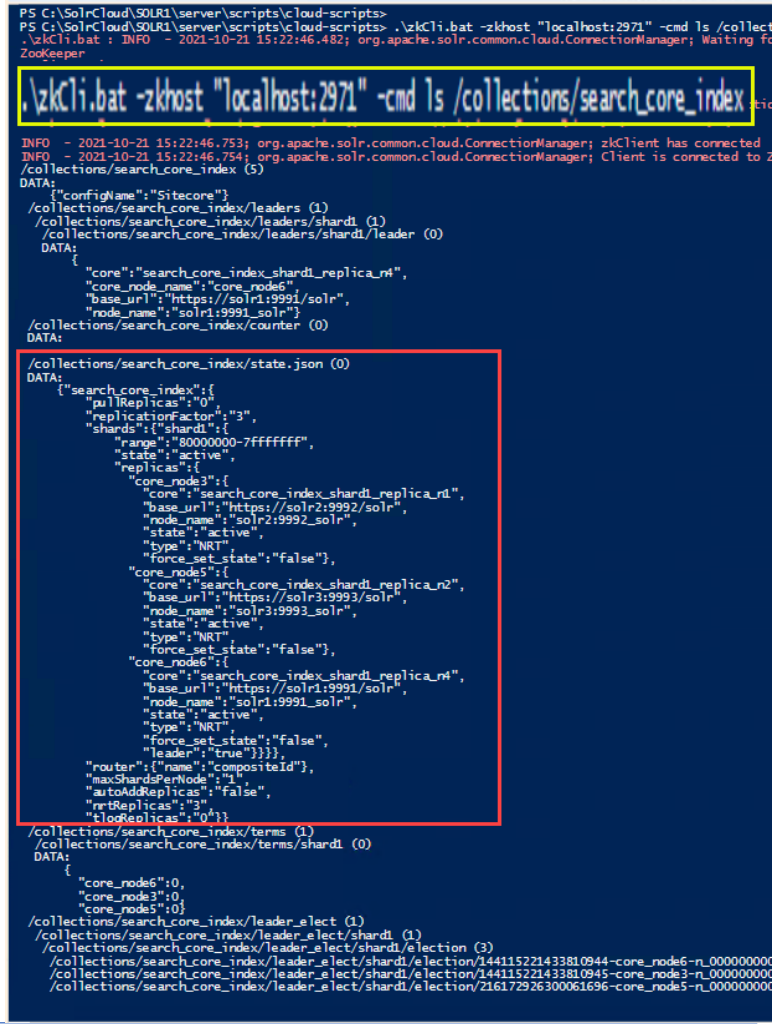
Create a collection + uploading to ZooKeeper a custom Solr configuration (custom path)



Compare SolrCloud Admin and ZooKeeper Collections Info

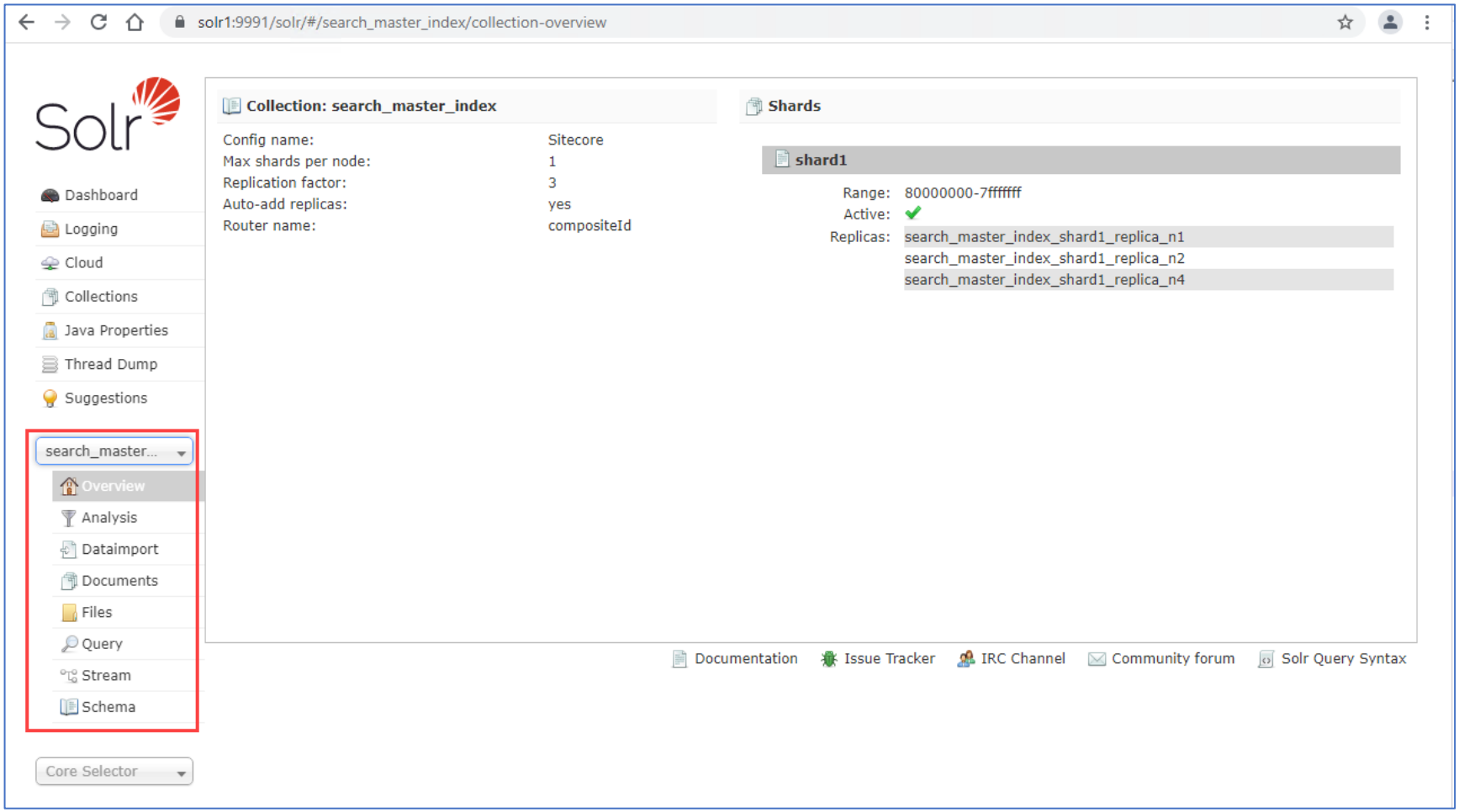
Solr Admin has same information as ZooKeeper has (Magnify to see the image contents below)





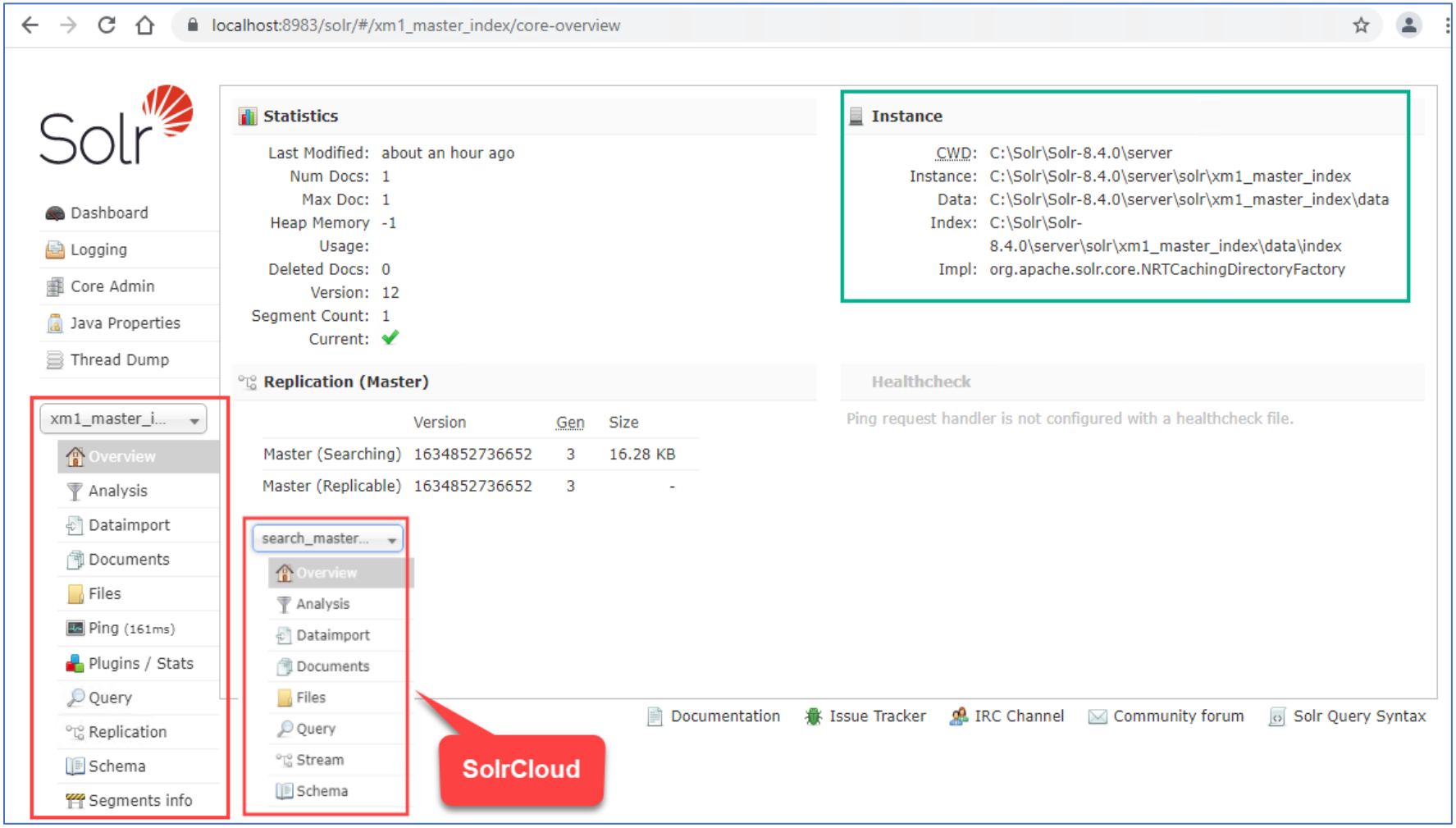
Compare SolrCloud Admin and Standalone Solr Admin

SolrCloud Admin



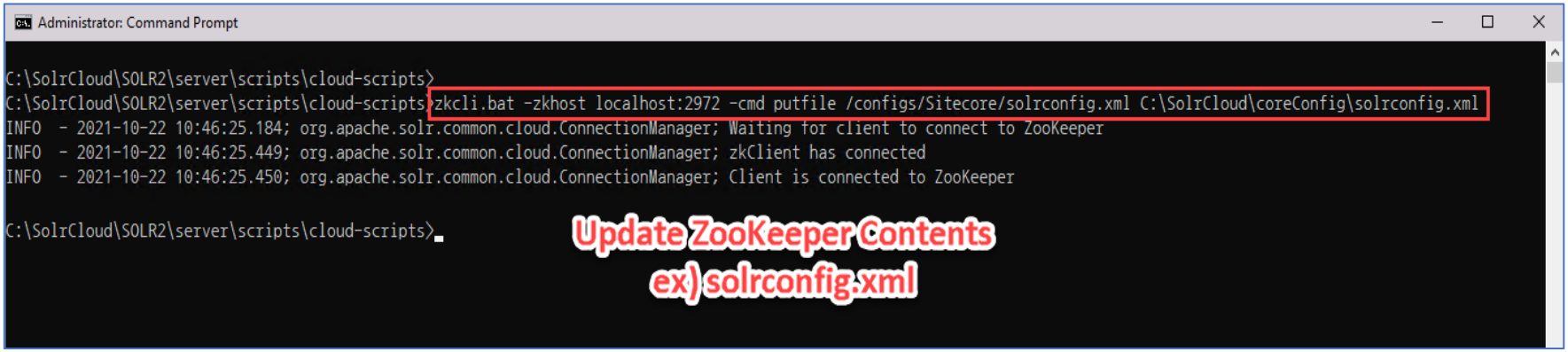
Compare Solr Admin Cloud and Standalone Solr Admin

Stand alone Solr Admin



Update ZooKeeper Content

Upload local file to ZooKeeper



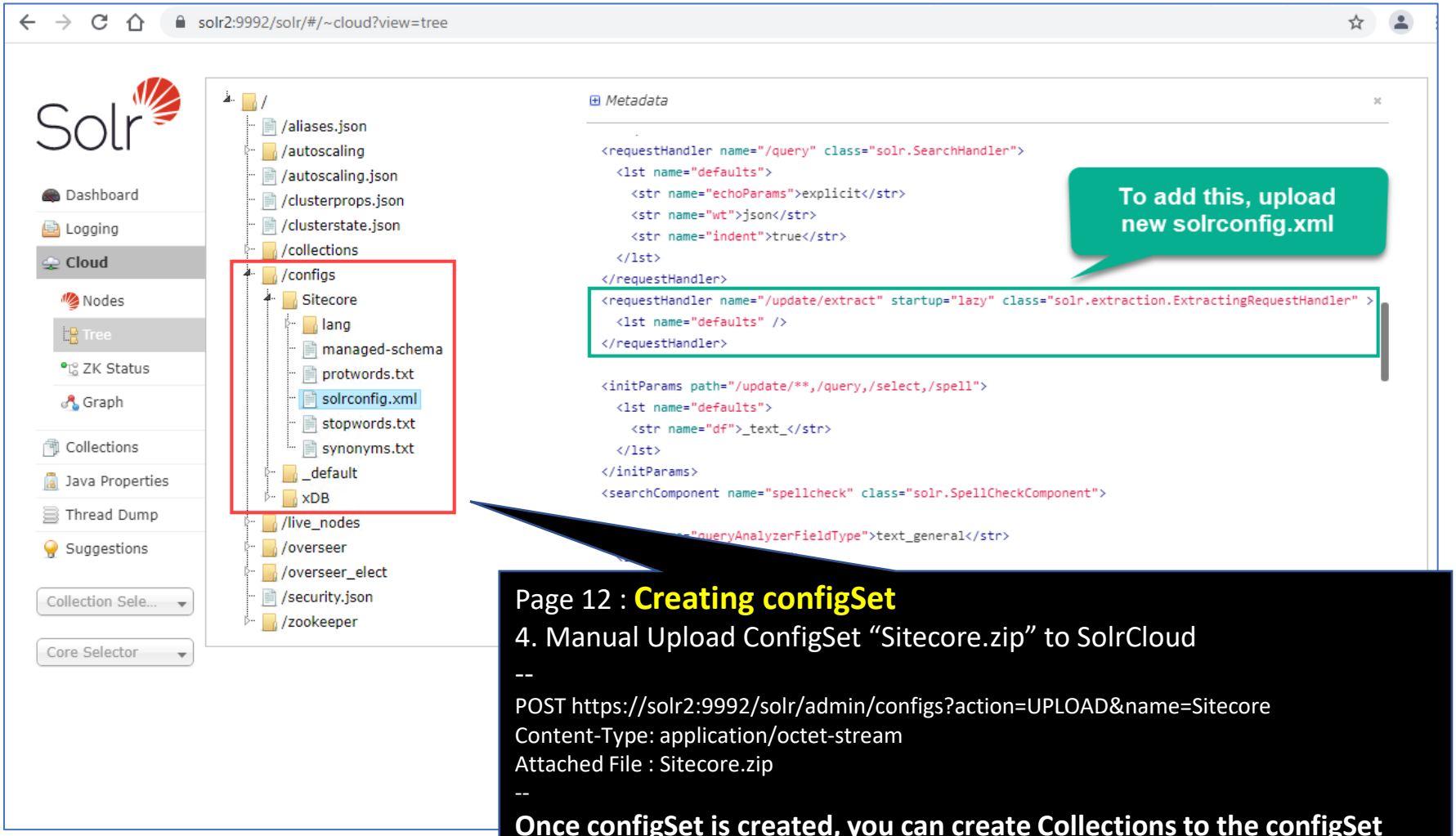

```
$zkData = @(
        @{Host = "localhost"; Folder = "zk1"; InstanceID = 1; ClientPort = 2971; EnsemblePorts = "2981:2991" },
        @{Host = "localhost"; Folder = "zk2"; InstanceID = 2; ClientPort = 2972; EnsemblePorts = "2982:2992" },
        @{Host = "localhost"; Folder = "zk3"; InstanceID = 3; ClientPort = 2973; EnsemblePorts = "2983:2993" }
)

$solrData = @(
        @{Host = "solr1"; Folder = "SOLR1"; ClientPort = 9991 },
        @{Host = "solr2"; Folder = "SOLR2"; ClientPort = 9992 },
        @{Host = "solr3"; Folder = "SOLR3"; ClientPort = 9993 }
)
```

C:\SolrCloud\SOLR2\server\scripts\cloud-scripts>

zkcli.bat -zkhost localhost:2972 -cmd putfile /configs/Sitecore/solrconfig.xml C:\SolrCloud\coreConfig\solrconfig.xml

Update ZooKeeper Content

Verify Upload Results



Page 12 : **Creating configSet**

4. Manual Upload ConfigSet “Sitecore.zip” to SolrCloud

--

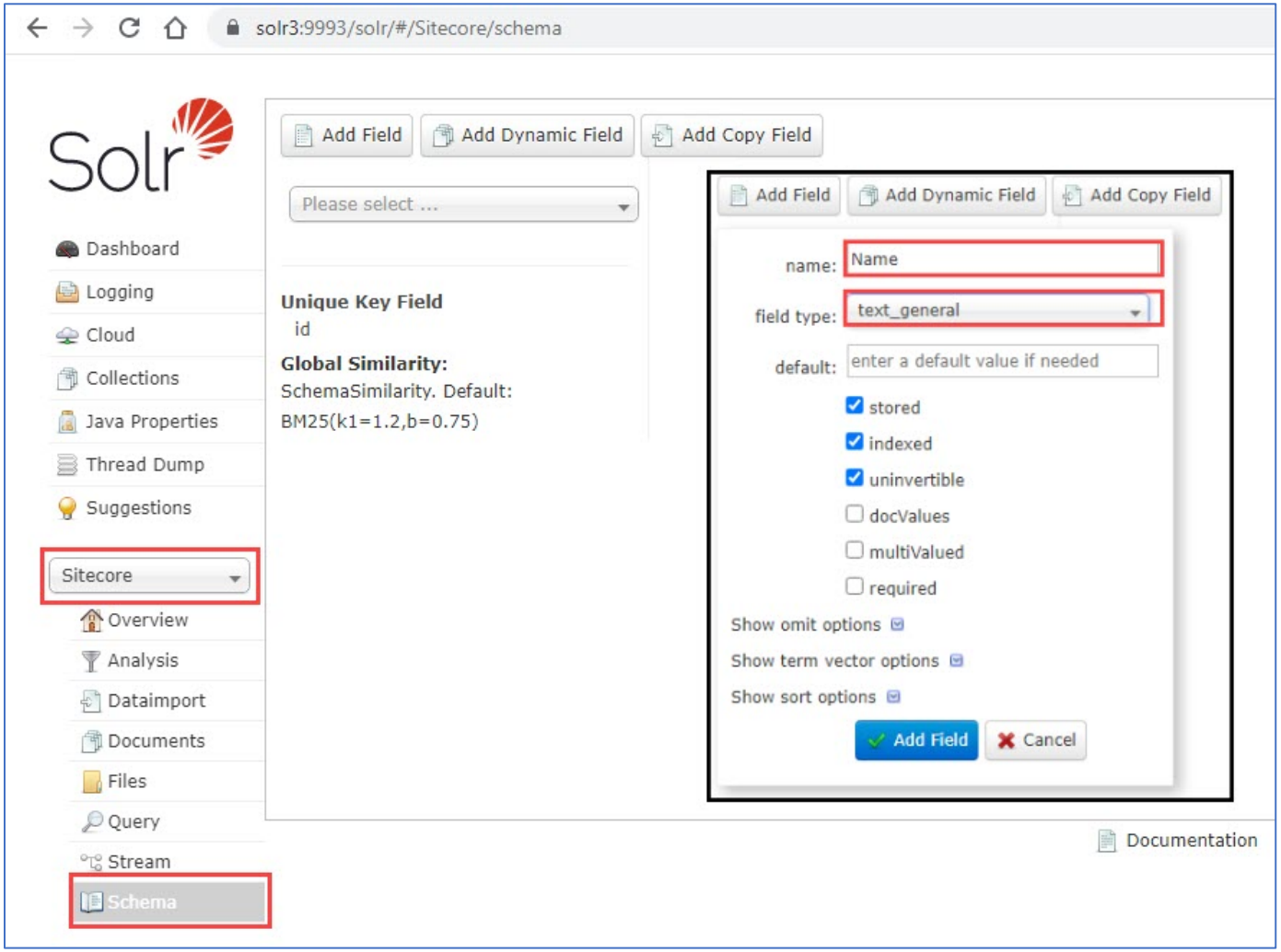
POST https://solr2:9992/solr/admin/configs?action=UPLOAD&name=Sitecore
Content-Type: application/octet-stream
Attached File : Sitecore.zip

--

Once configSet is created, you can create Collections to the configSet

SolrCloud Indexing & Query

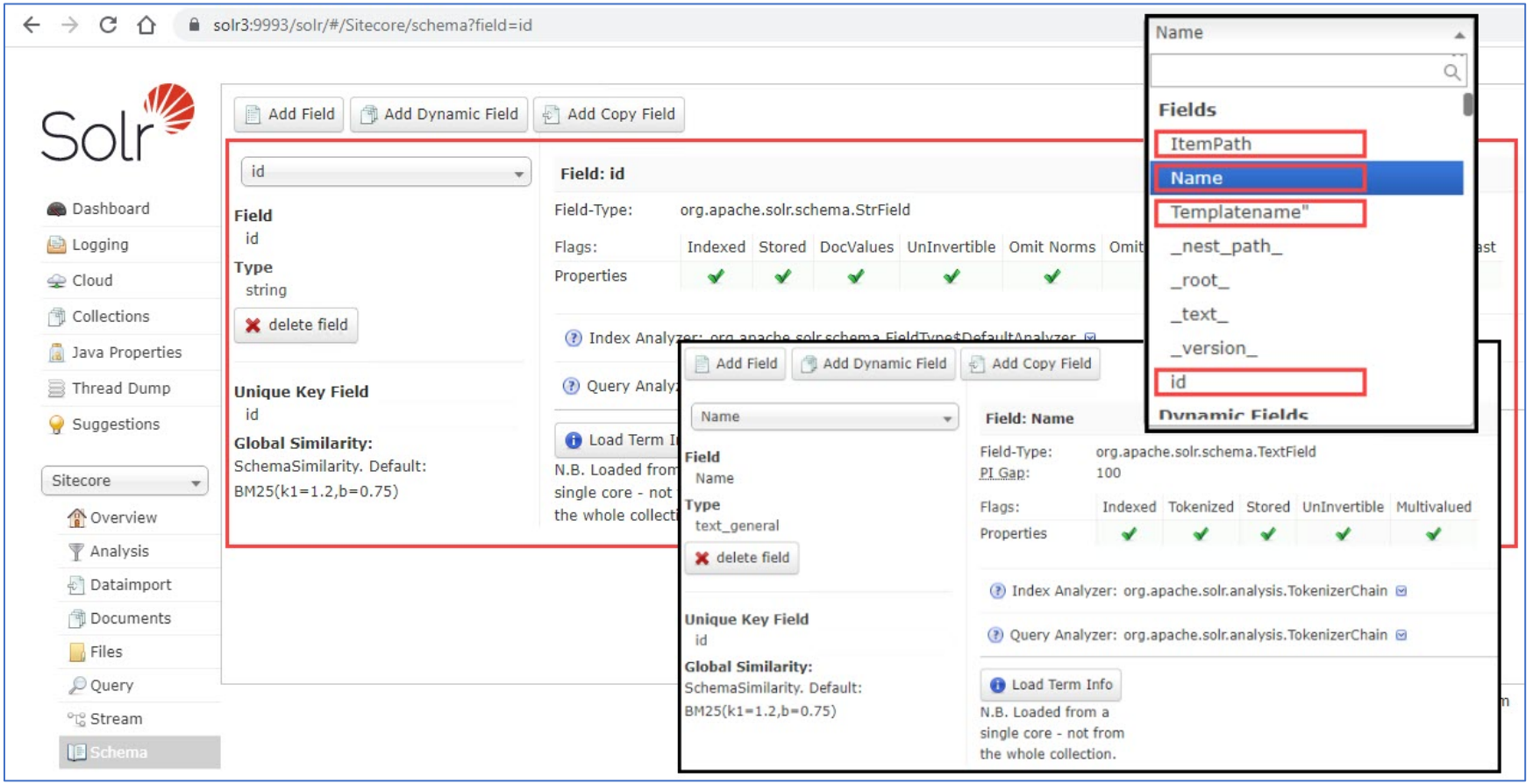
Add Schema Field using Admin Panel – On “Sitecore” Collection



This Field value will be
- Indexed,
- Stored,
- Uninvertable
When data is loaded

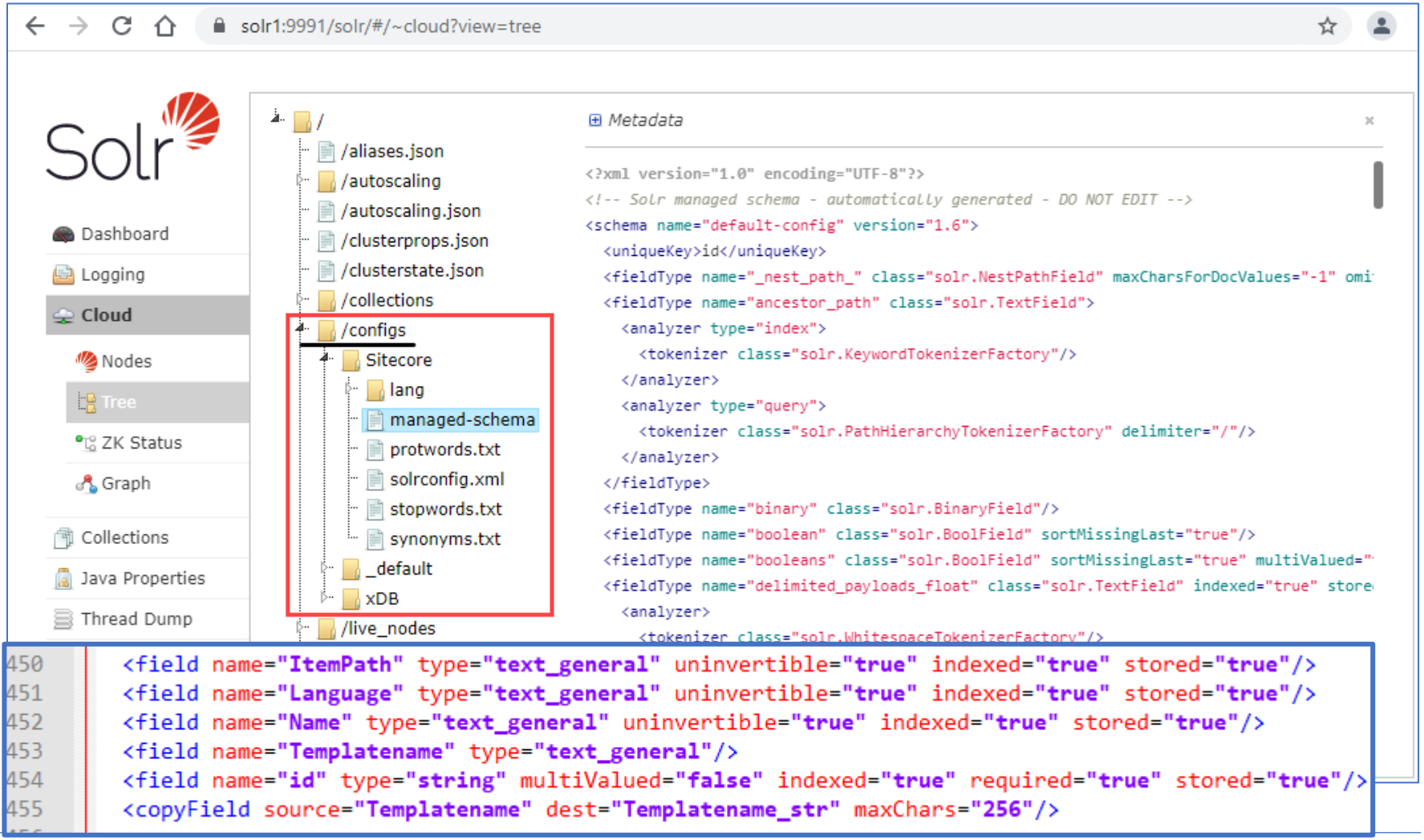
SolrCloud Indexing & Query

Add Schema Field using Admin Panel – On “Sitecore” Collection



SolrCloud Indexing & Query

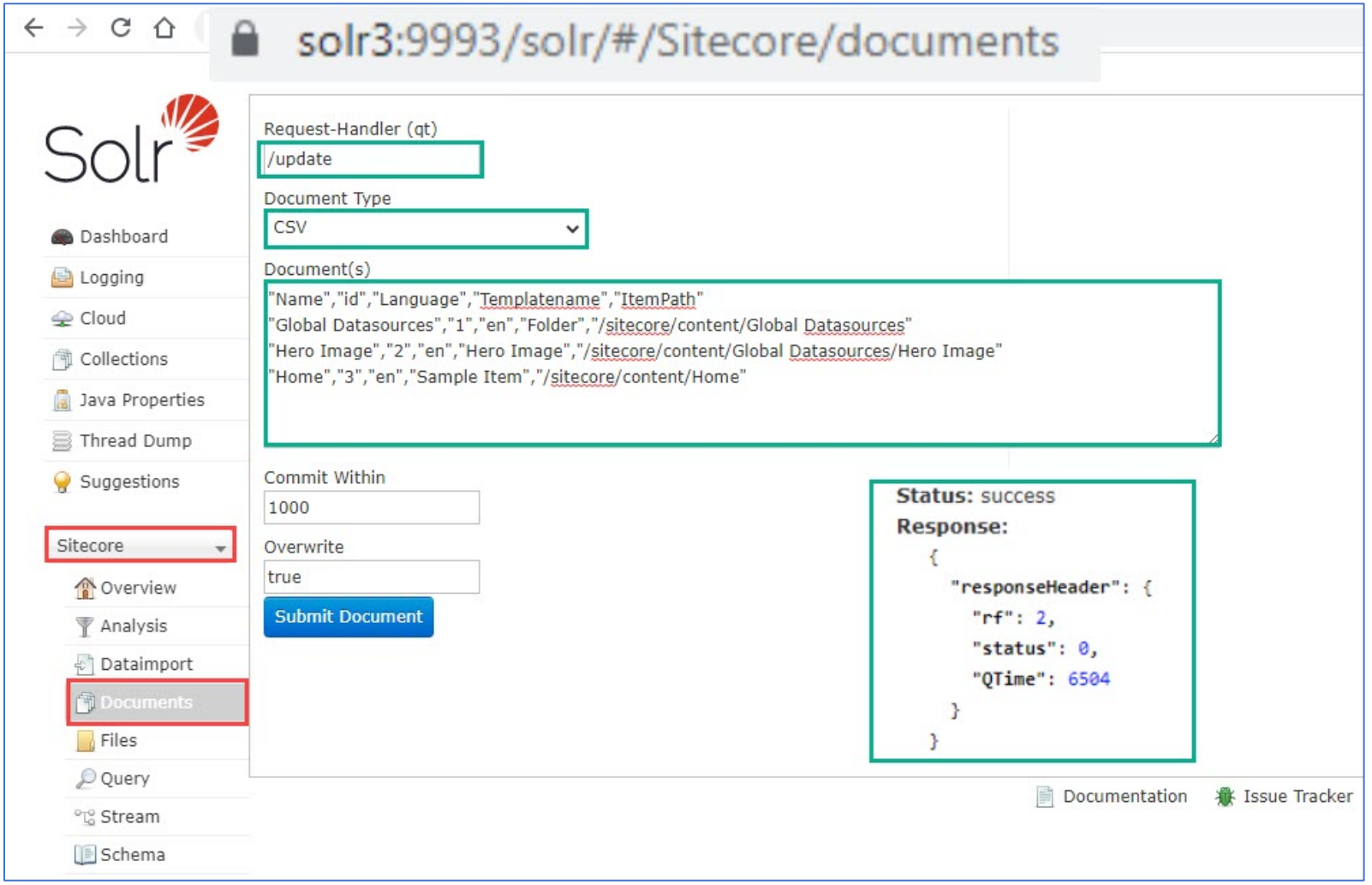
SolrCloud update "**managed-schema**" **(<!-- Solr managed schema - automatically generated - DO NOT EDIT -->)**




```
450   <field name="ItemPath" type="text_general" uninvertible="true" indexed="true" stored="true"/>
451   <field name="Language" type="text_general" uninvertible="true" indexed="true" stored="true"/>
452   <field name="Name" type="text_general" uninvertible="true" indexed="true" stored="true"/>
453   <field name="Templatename" type="text_general"/>
454   <field name="id" type="string" multiValued="false" indexed="true" required="true" stored="true"/>
455   <copyField source="Templatename" dest="Templatename_str" maxChars="256"/>
```

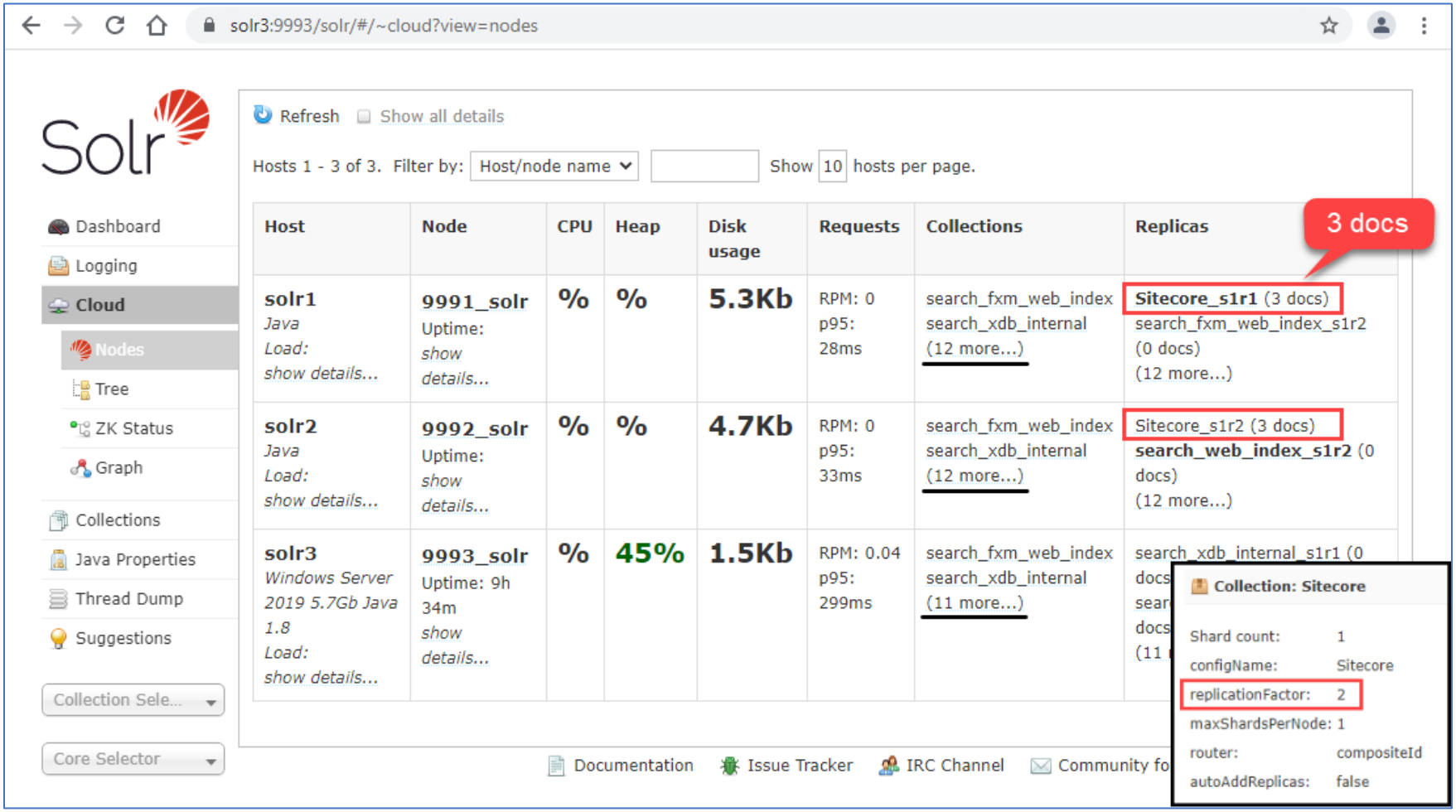
SolrCloud Indexing & Query

Upload data to SolrCloud Collection & Let Solr Indexing

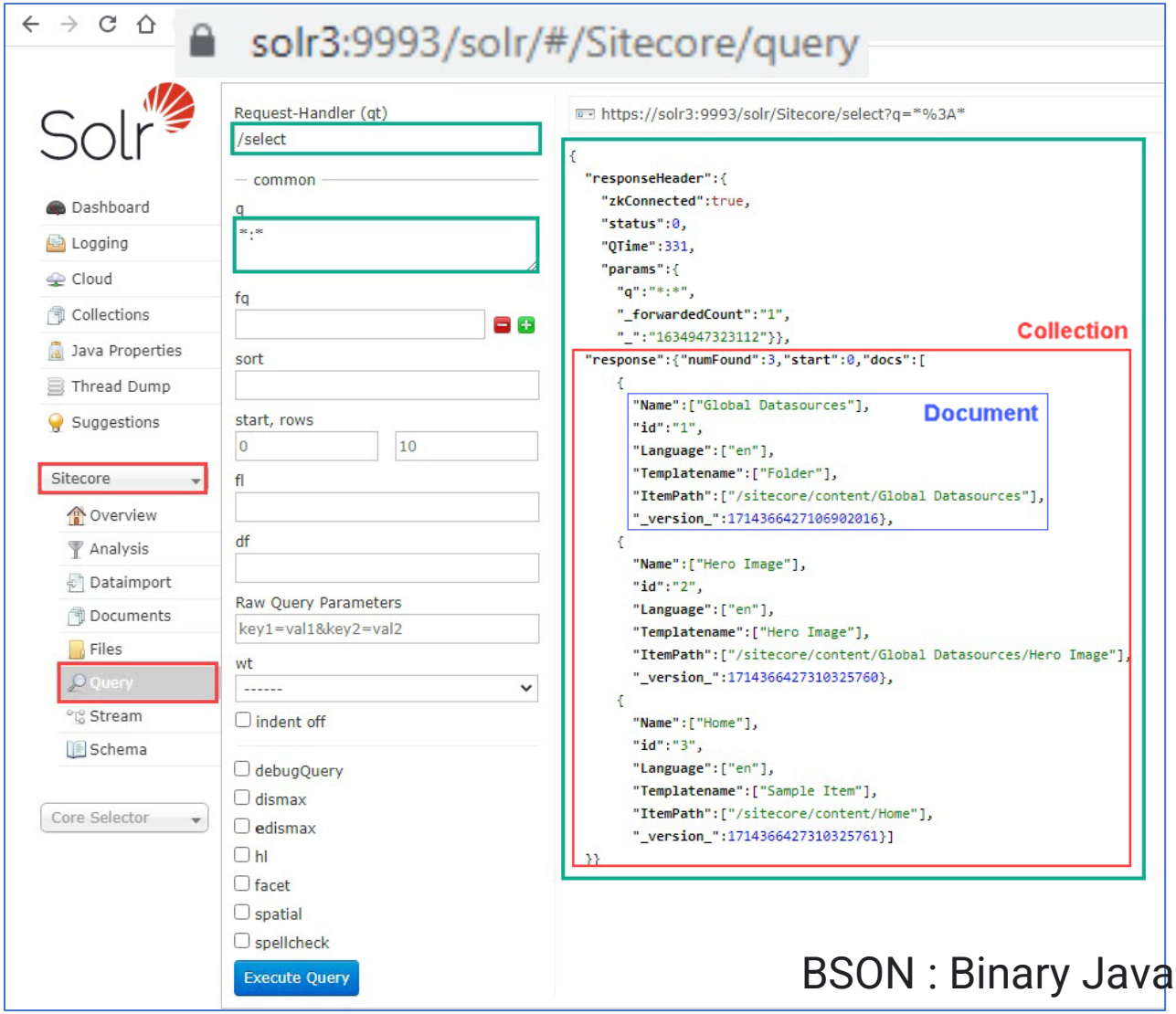


SolrCloud Indexing & Query

All “Replica” has been **Replicated** (For test, Sitecore Collection creates only 2 replica)

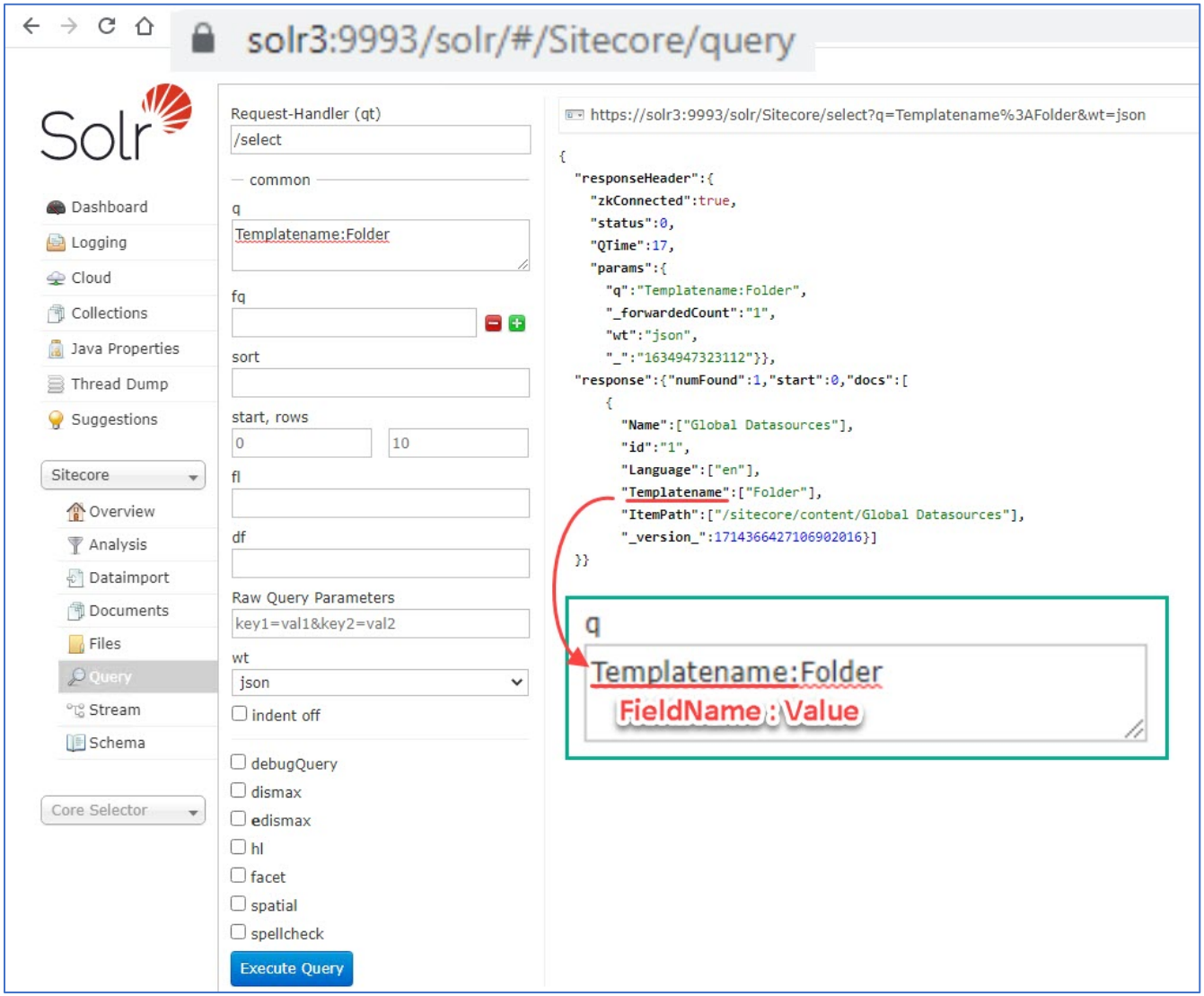


SolrCloud Indexing & Query



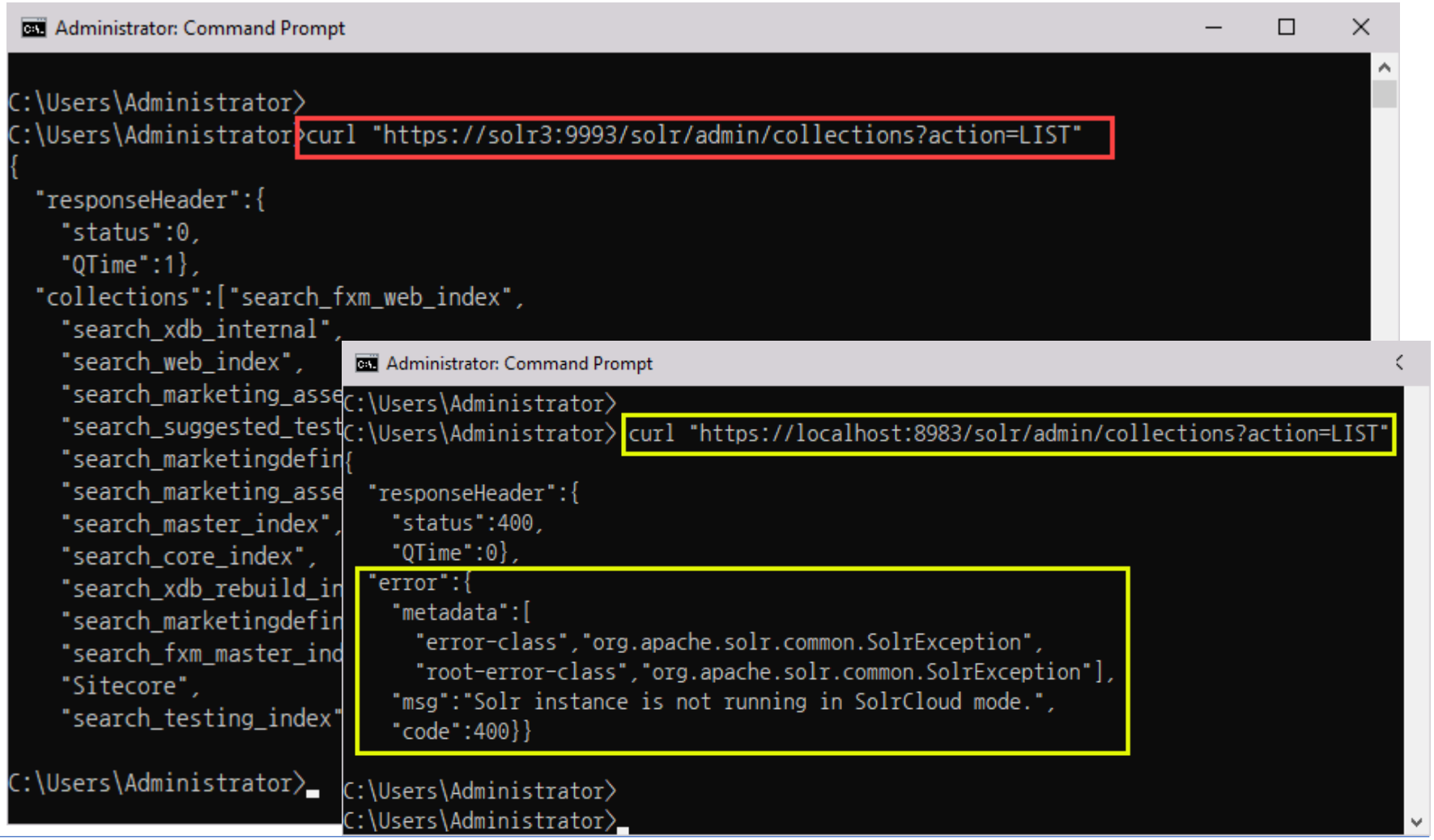
BSON : Binary Javascript Object Notation

SolrCloud Indexing & Query



SolrCloud Indexing & Query

HTTP GET : https://solr2:9992/solr/admin/collections?action=LIST&omitHeader=true



SolrCloud Indexing & Query

Schema-less Collections and Documents