



Domino Containers The Next Step

Update from the community project



Martijn de Jong | 19 September 2024

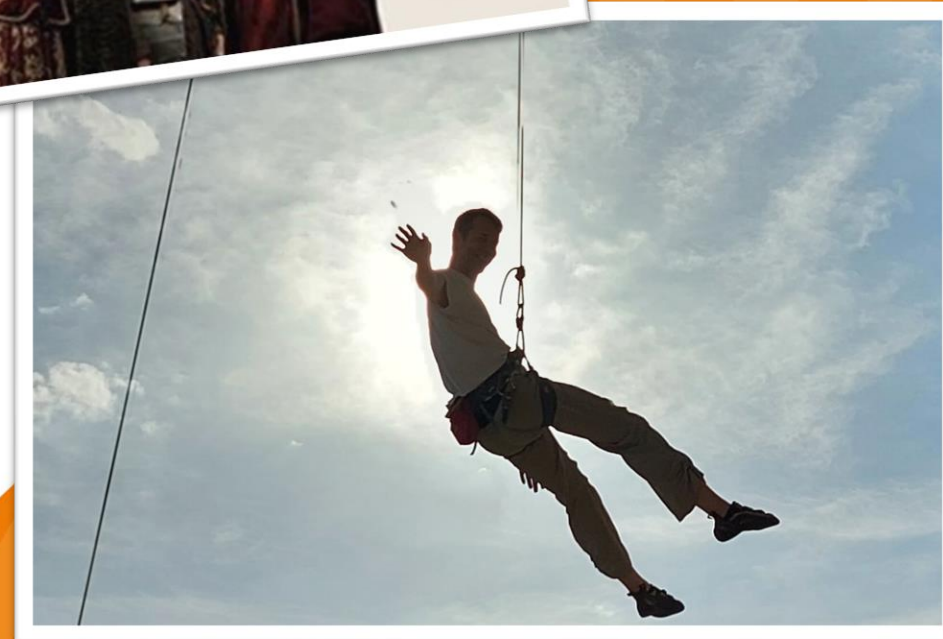




Martijn de Jong

- Senior HCL Consultant @ -office
- Studied electrical engineering, psychology and music
- Working with “Lotus” portfolio since 2000
- <https://blog.martdj.nl>

@martdj



Why do I present this session?

- ▶ Working with Linux containers since 2018
- ▶ Involved in the Domino container community project since 2020
- ▶ Daniel Nashed does the scripting, I do the testing and documentation (on my blog)
- ▶ First Domino container session for the community project in 2022

2 years ago...

Agenda

- ▶ History of Containers
- ▶ Container Basics
- ▶ Why Domino containers in production
- ▶ Build-up of the Domino Container
- ▶ Building the image
- ▶ Install and run a new Domino server
- ▶ Convert an existing Domino server
- ▶ Customising / upgrading an Image
- ▶ Conclusion



**Any Questions...
Just Ask!**

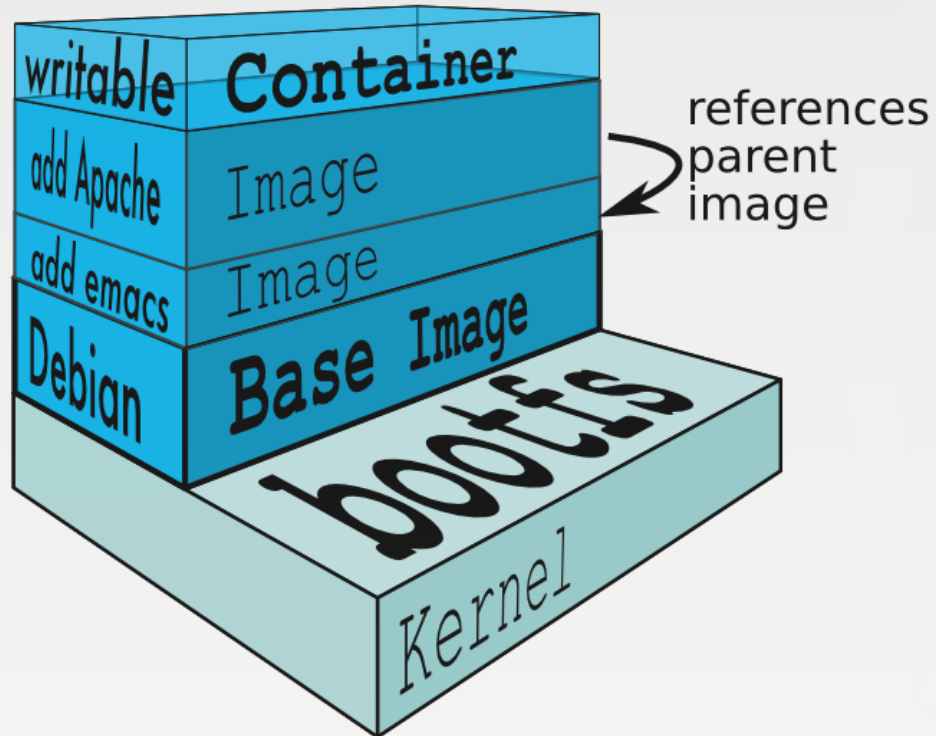


<https://youtu.be/wx5jv0rwn00>

2 years ago... (2)

- ▶ History of Containers
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Buildup of a container



REMINDER

Why run Domino as a Container?

- ▶ Standardisation
 - ▶ Start / stop command, locations of folders are the same on all servers
- ▶ Upgradability
 - ▶ Upgrading a server takes less than a minute
- ▶ Portability
 - ▶ Moving a server becomes a lot easier
- ▶ Testing
 - ▶ Containers make it much easier to test how your applications behaves with a new version



2 years ago...


Demo	Result	Duration
<code>build.sh domino -capi -verse -nomad</code>	Container image with latest Domino version, Verse, Nomad and the C API	6:35 minutes
<code>build.sh traveler</code>	Adds Traveler to Domino image	1:17 minutes
<code>build.sh volt -from=localhost/hclcom/traveler</code>	Adds Volt (Leap) to Traveler image	33 seconds
<code>dominoctl build</code>	Create your own customized image based on the previous image	35 seconds

Frequently Asked Questions

- ▶ I'm a Linux newbie. How do I start with this?
- ▶ How do I create an image from scratch?
- ▶ How do I start a Domino server from that image?
- ▶ How do I update the Linux packages inside the container?
- ▶ Can I automate that?
- ▶ How do I add custom packages to the Domino program directory?
- ▶ Can I have a Domino container partitioned server?

Demo machine

SOFTWARE SELECTION ROCKY LINUX 9.3 INSTALLATION

[Done](#)  us (intl) [Help!](#)

Base Environment

- Server with GUI**
An integrated, easy-to-manage server with a graphical interface.
- Server**
An integrated, easy-to-manage server.
- Minimal Install**
Basic functionality.
- Workstation**
Workstation is a user-friendly desktop system for laptops and PCs.
- Custom Operating System**
Basic building block for a custom Rocky Linux system.
- Virtualization Host**
Minimal virtualization host.

Additional software for Selected Environment

- Standard**
The standard installation of Rocky Linux.
- Legacy UNIX Compatibility**
Compatibility programs for migration from or working with legacy UNIX environments.
- Console Internet Tools**
Console internet access tools, often used by administrators.
- Container Management**
Tools for managing Linux containers
- Development Tools**
A basic development environment.
- .NET Development**
Tools to develop and/or run .NET applications
- Graphical Administration Tools**
Graphical system administration tools for managing many aspects of a system.
- Headless Management**
Tools for managing the system without an attached graphical console.
- Network Servers**
These packages include network-based servers such as DHCP, Kerberos and NIS.
- RPM Development Tools**
Tools used for building RPMs, such as rpmbuild.
- Scientific Support**
Tools for mathematical and scientific computations, and parallel computing.
- Security Tools**
Security tools for integrity and trust verification.
- Smart Card Support**
Support for using smart card authentication.
- System Tools**
This group is a collection of various tools for the system, such as the client for connecting to SMB shares and tools to monitor network traffic.

Demo machine

SOFTWARE SELECTION ROCKY LINUX 9.3 INSTALLATION

[Done](#) [us \(intl\)](#) [Help!](#)

Base Environment

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Install container environment

<https://github.com/nashcom/domino-startscript>

The screenshot shows the GitHub repository page for `nashcom/domino-startscript`. The file `install_container_env.sh` is highlighted with an orange box. A callout box shows the file icon and name.

File Name	Description	Last Commit
OneTouchSetup	Start Script menu changes for automatic server configuratio...	2 weeks ago
build_image	changes for dominoctl build script. check for docker/podma...	2 years ago
commands	Publishing Version 3.7.0	2 years ago
docs	better error handling and documentation update	3 months ago
extra	improved support for MacOS	last year
snmp	make OTS restartServer default (requires Domino 14.0). SNM...	2 weeks ago
sysconfig	preparing version 3.7.3 including fix for SELinux compatibilit...	6 months ago
DominoOneTouchSetup.sh	update for Docker install commands	2 months ago
LICENSE	Initial commit	2 years ago
README.md	start script version 3.8.0	4 months ago
current_version.txt	version file updates	4 months ago
docker-compose.yml	one touch validation enhancements and adding docker-com...	2 years ago
domdownload.sh	Remove logic now executed installer script	last month
domino.cfg	Publishing Version 3.7.0	2 years ago
domino.service	start script version 3.8.0	4 months ago
domino_container	start script version 3.8.0	4 months ago
domino_container.service	start script version 3.8.0	4 months ago
endpoint.sh	update for Docker install commands	2 months ago
install_borg	minor start script installer changes	2 years ago
install_container_env.sh	Domino installation updates	last month
install_domino.sh	update version to 3.9.0	last month
install_dominoctl	let install_dominoctl to also update the podman service with...	6 months ago

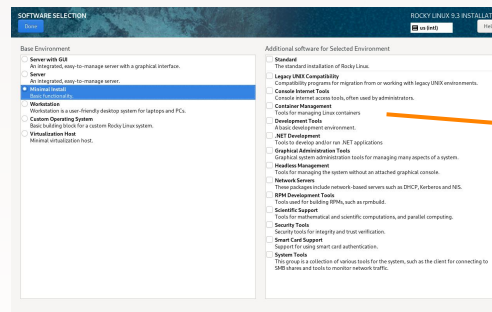
 `install_container_env.sh`

Starting a Domino container

▶ `install_container_env.sh` prepares your server for running a Domino container:

- ▶ Installs required software (docker or podman, net-utils, jq, bind-utils, sysstat, tar)
- ▶ Adds notes:notes user and group
- ▶ Creates directory structure in `/local/` for the Domino server data (`/local/notesdata`, `/local/translog`, ...)
- ▶ Clones HCL Domino container project and Domino start script project
- ▶ Installs NashCom Domino container script (`dominoctl`)
- ▶ Sets security limits

The script will install Docker unless Podman is already installed



Container Management
Tools for managing Linux containers

Building a Domino image

```
▶ curl -fsSL https://github.com/nashcom/domino-startscript/raw/main/install_container_env.sh | sh
```

```
-----  
Configure Domino Download Token  
-----
```

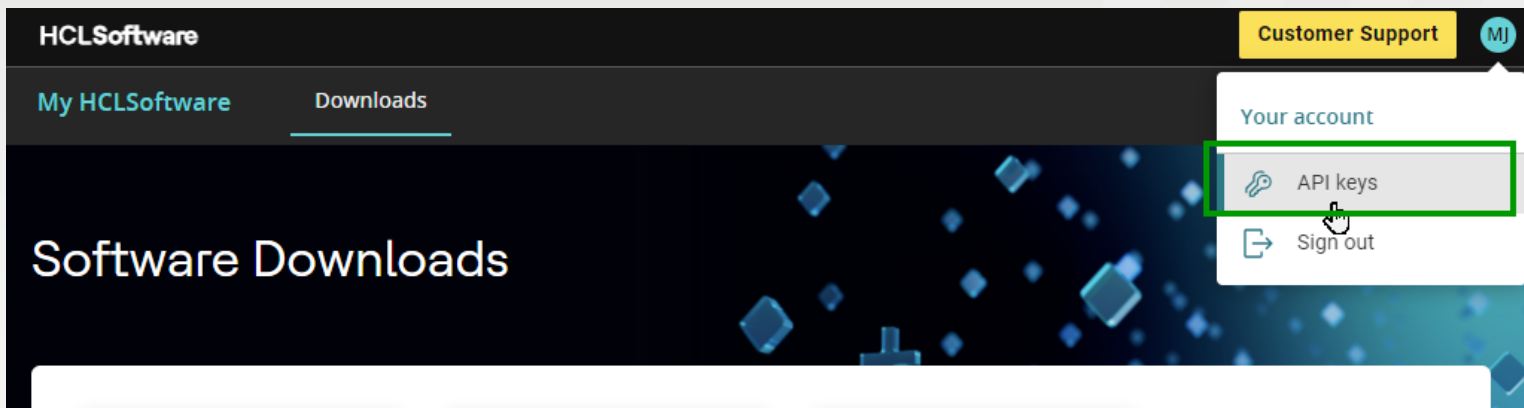
```
My HCL Software portal requires a download token.
```

```
Please visit -> https://my.hcltechsw.com
```

- Log in with your HCL software account.
- Navigate to the upper right corner and select 'API keys' to generate a key.
- Specify the generated key as a download token below.

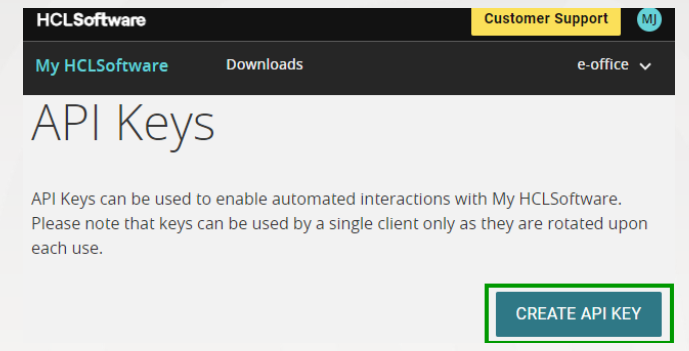
```
Enter Download Token:
```

Domdownload token



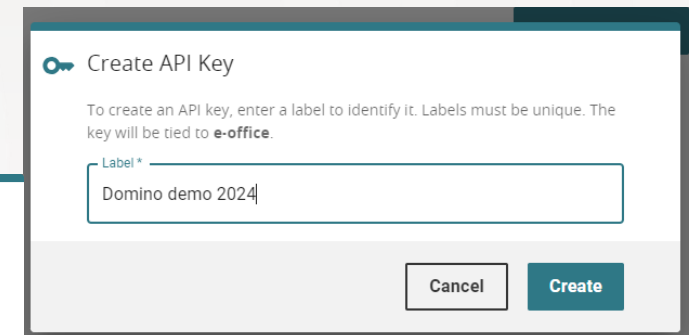
The screenshot shows the HCLSoftware user interface. At the top, there is a navigation bar with 'HCLSoftware' on the left, 'Customer Support' in a yellow box on the right, and a user profile icon 'MJ'. Below this, there are tabs for 'My HCLSoftware' and 'Downloads'. The main heading is 'Software Downloads'. A dropdown menu is open under the user profile, showing 'Your account' with two options: 'API keys' (highlighted with a green box) and 'Sign out'. Below the main heading, there are three cards for 'HCL Connections', 'HCL Digital Experience', and 'HCL Domino'. A modal dialog titled 'Create API Key' is overlaid on the page. It contains the text: 'This is the initial refresh token. It can be exchanged for an access token, at which point it will be rotated.' Below this is an information icon and a note: 'This refresh token will only be visible now. Do not close the dialog until it has been copied to a secure location.' A text input field contains a long alphanumeric string, and a copy icon is to its right. The modal is titled 'Your token' and has a 'Close' button.

<https://my.hcltechsw.com/>



The screenshot shows the 'API Keys' page in the HCLSoftware interface. The navigation bar is the same as in the previous screenshot. The page title is 'API Keys'. Below the title, there is explanatory text: 'API Keys can be used to enable automated interactions with My HCLSoftware. Please note that keys can be used by a single client only as they are rotated upon each use.' A 'CREATE API KEY' button is highlighted with a green box.

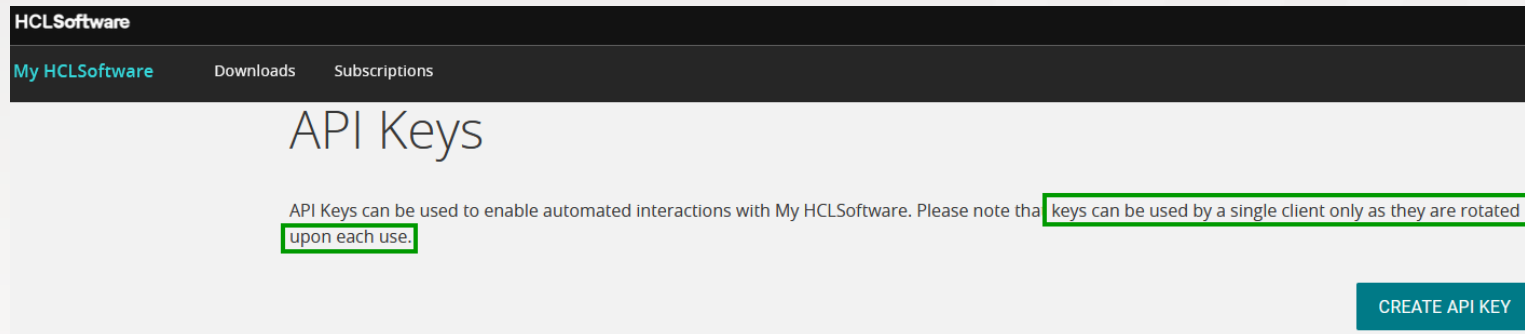
CREATE API KEY



The 'Create API Key' modal dialog is shown. It has a title 'Create API Key' and a key icon. The text reads: 'To create an API key, enter a label to identify it. Labels must be unique. The key will be tied to e-office.' Below this is a text input field labeled 'Label *' containing the text 'Domino demo 2024'. At the bottom right of the modal are 'Cancel' and 'Create' buttons.

My HCLSoftware Portal was great...

- ▶ And then some guy from legal looked at it... (or so it seems)
- ▶ API Keys can be used by a single client only. Create a unique token per client



- ▶ They do expire
- ▶ So check your token or create a new one before you build your Domino image

License agreement

- ▶ And you have to accept a license now before you can download a product type

HCLSoftware Customer Support e-office

My HCLSoftware Downloads Subscriptions

HCL Connections | 8.0 CR7 (16 Jul 2024)

Read and accept the [applicable license agreements](#) to download files.

Connections 8.0 CR7 Resources

- ◆ [What's new in HCL Connections 8.0 CR7](#)
- ◆ [Connections 8.0 Cumulative Release \(CRI\) List](#)

Downloads

Name	Description	Platform	Released	Size	Actions
ComponentPack_8.0_CR7_Legal_Notices.zip	HCL Connections Component Pack v8.0 CR7 Legal Notices	all	16 Jul 2024	428.79 KB	Accept license
HCL8.0_CR7.zip	HCL Connections v8.0 CR7	all	16 Jul 2024	1.68 GB	Accept license

- ▶ Luckily only once (so once for all Domino related software, except Domino Leap)
- ▶ It's still way better than FlexNet!

Building a Domino image

- ▶ `curl -fsSL https://github.com/nashcom/domino-startscript/raw/main/install_container_env.sh | sh`
- ▶ `cd /local/github/domino-container`
- ▶ `./build.sh`

Let's see that live

- ▷ Build a Domino 14 image with:
 - ▷ Traveler
 - ▷ Nomad server
 - ▷ Domino Leap
 - ▷ OnTime
 - ▷ Verse



Other options during build

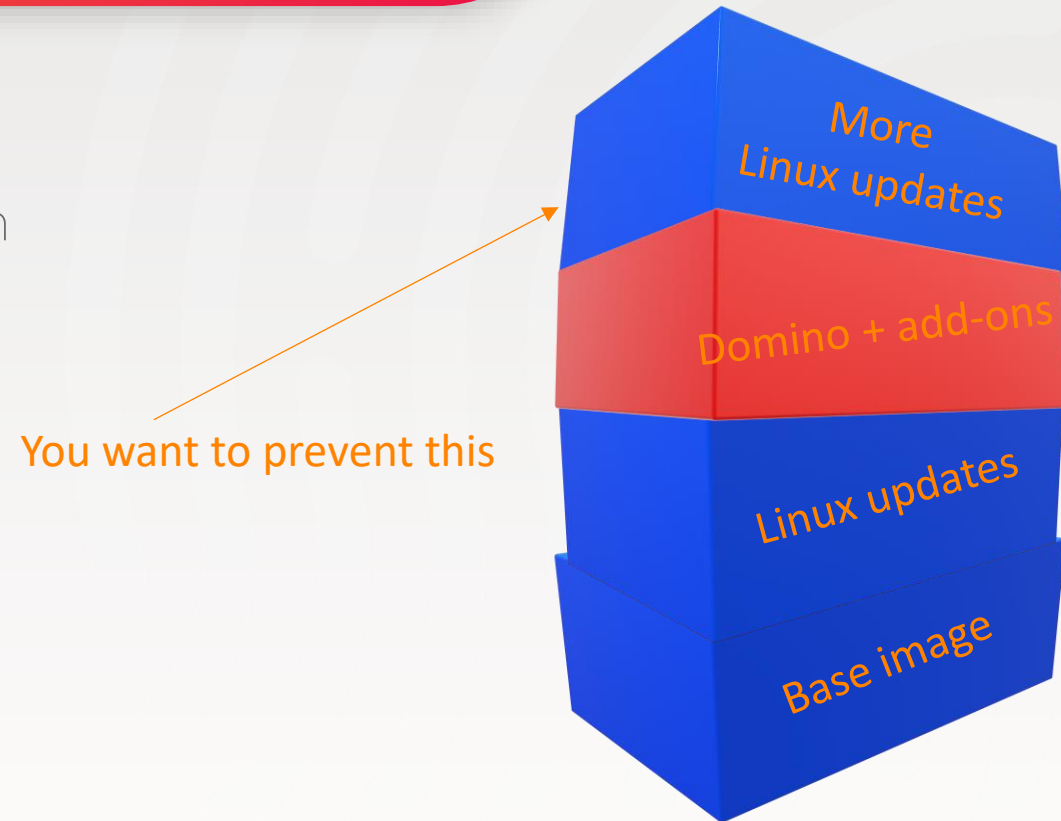
- ▶ **-scan**
Scan a Domino container image with trivy (trivy needs to be installed)
- ▶ **-from=ubuntu**
Domino can be build on other Linux base images, like RedHat ubi, VMWare Photon, Ubuntu etc
- ▶ **-conf=appserver.conf**
Build from the command line based on a configuration file that you created with the menu
Different type of configuration files for different types of servers

Automation Testing

```
[root@demo2024 domino_automation_test_local]# cat result_autotest.csv
addon.installed.ontime| installed|SUCCESS|
addon.installed.verse| installed|SUCCESS|
addon.installed.nomad| installed|SUCCESS|
addon.installed.traveler| installed|SUCCESS|
addon.installed.domrestapi| installed|SUCCESS|
addon.installed.leap| installed|SUCCESS|
domino.jvm.available|Domino JVM available|SUCCESS|
domino.server.running|Domino Server startup|SUCCESS|
domino.http.running|Domino HTTP Server running|SUCCESS|
domino.certificate.available|Certificate chain downloaded|SUCCESS|
domino.server.onetouch.microca-cert|Domino One Touch create MicroCA|SUCCESS|
traveler.server.available|Traveler server available|SUCCESS|
nomad.server.available|Nomad server available|SUCCESS|
verse.server.available|Verse available|SUCCESS|
restapi.server.available|Domino REST-API available|SUCCESS|
domino-leap.server.available|Domino Leap available|SUCCESS|
domino-leap.server.version|Domino Leap version found|SUCCESS|
domino.server.onetouch.createdb|Domino One Touch create database|SUCCESS|
domino.idvault.create|Domino ID Vault create|SUCCESS|
domino.backup.create|Backup create|SUCCESS|
startscript.archive|Start Script archive|SUCCESS|
nsd.gdb|NSD GDB callstacks|SUCCESS|
container.health|Container health|SUCCESS|
startscript.server.restart|Start Script restart server|SUCCESS|
domino.translog.create|Translog create|SUCCESS|
tikaserver.available|Check if Tika Server can be started|SUCCESS|
```

How do I update Linux packages in the image?

- ▶ There is more than one way
- ▶ Most sensible way:
Rebuilding the image from scratch



Can I automate that?

- ▶ Absolutely! HCL does this internally
- ▶ Do you remember that I saved the configuration?
- ▶ And that the build script has automated testing?
- ▶ `./build.sh -conf=<your saved config file>`
- ▶ If all tests were successful it will return 0

Running a Domino server

- ▷ `dominoctl cfg`
 - ▷ `dominoctl setup`
 - ▷ `dominoctl start`
 - ▷ `dominoctl console`
- ▷ Remember: If you use the host network, you need to create firewall rules to open the Domino ports



One Touch Setup

- ▷ Configure a server using an OTS json-file
- ▷ Copy it to `/etc/sysconfig/DominoContainerAutoConfig.json`
- ▷ There are other ways too!
- ▷ The Domino container image is OTS-aware!
- ▷ `dominoctl start`
- ▷ `dominoctl console`
- ▷ Find Nomad at <https://demo-nomad.martdj.nl>
- ▷ and Verse at <https://demo2024.martdj.nl>
- ▷ User: Senior admin
- ▷ Password: domino4ever



Frequently Asked Questions

- ▶ I'm a Linux newbie. How do I start with this? ✓
- ▶ How do I create an image from scratch? ✓
- ▶ How do I start a Domino server from that image? ✓
- ▶ How do I update the Linux packages inside the container? ✓
- ▶ Can I automate that? ✓
- ▶ How do I add custom packages to the Domino program directory?
- ▶ Can I have a Domino container partitioned server?

Creating a custom image

- ▶ Many companies have customisations in the Domino program directory
- ▶ Think of custom `jvm.properties`, company certificates in `cacerts`
- ▶ But also extra server tasks for custom add-ons, extra libraries, linux binaries etc
- ▶ It's not easy to add these to a Domino image...
- ▶ ... till now

Creating a custom image

- ▶ `build.sh -custom-addon=(https://)<path-to-compressed-tarball>#<sha256 of tarball>`
- ▶ Structure of the tarball:
 - ▶ `domino-bin`
Files will be added to Domino program directory (`/opt/HCL/notes/latest/linux`)
 - ▶ `domino-data`
Files will be added to notesdata folder
 - ▶ `linux-bin`
Files will be added to Linux binary directory (`/usr/bin`)
 - ▶ `Install.sh`
Install anything wherever you want. Install extra packages etc



Progress looks like...

Demo 2 years ago	Result	Duration
<code>build.sh domino -capi -verse -nomad</code>	Container image with latest Domino version, Verse, Nomad and the C API	6:35 minutes
<code>build.sh traveler</code>	Adds Traveler to Domino image	1:17 minutes
<code>build.sh volt --from=localhost/hclcom/traveler</code>	Adds Volt (Leap) to Traveler image	33 seconds
<code>dominoctl build</code>	Create your own customized image based on the previous image	35 seconds
Demo now	Result	Duration
<code>build.sh --conf default.conf --custom-addon=https://domino-apps.martdj.nl/spamgeek.taz#35a3931e9b6708100f08c1c7d3c022f133c6cd9cf5212a9b2dd08bb93ddfd692</code>	A container image with the same add-ons as 2 years ago	5:36 minutes

Upload images to your own registry

- ▶ A container registry is needed to use the same container image on multiple hosts
- ▶ Many options. Popular ones:
 - ▶ hub.docker.com – One repository is free
 - ▶ Docker registry – simple local registry
 - ▶ Harbor
- ▶ Harbor is an enterprise grade registry
- ▶ Includes scanning for vulnerabilities, access rights and other extras

- ▶ Tag your image: `docker tag <image id> <registry url>/<repository>/<image name>:<version>`
e.g. `docker tag 620f4c10bf0a harbor.martdj.nl/hclcom/domino:latest`
- ▶ Login if needed: `docker login <registry url>`
- ▶ Push the image: `docker push <image id> <registry url>/<repository>/<image name>:<version>`



registry Docker Official Image · ↓ 1B+ · ☆ 4.0K
Distribution implementation for storing and distributing of container images and artifacts

DATABASES & STORAGE

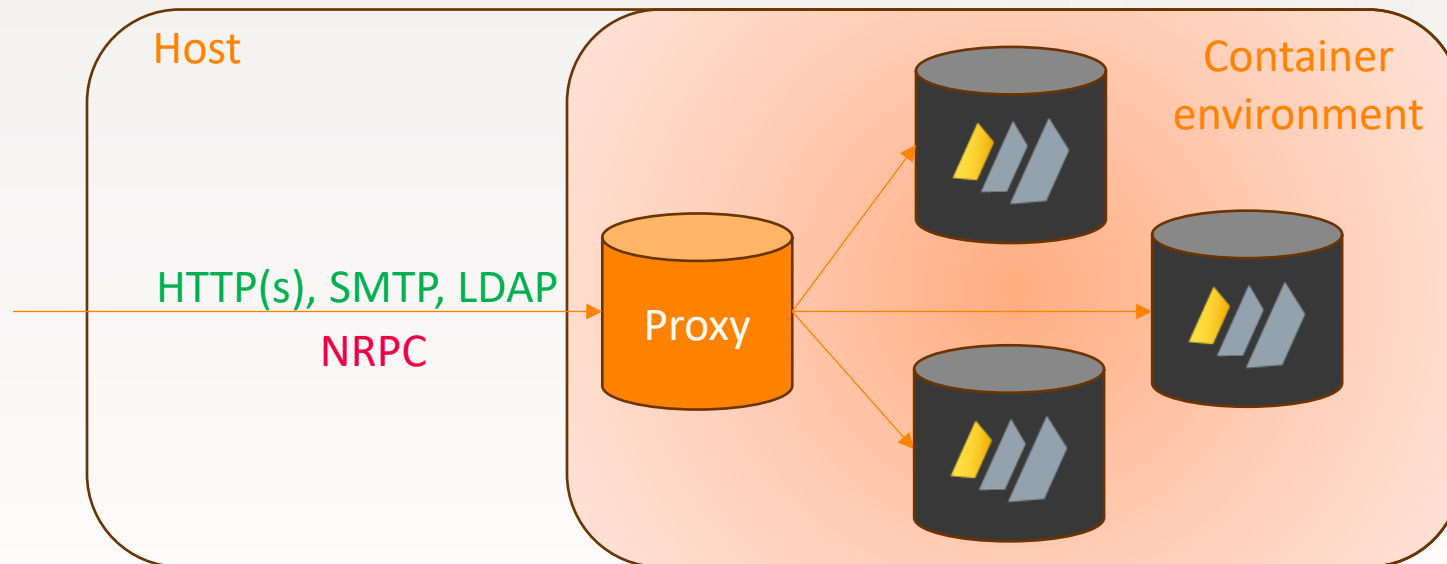


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- ▶ Can I automate that? ✓
- ▶ How do I add custom packages to the Domino program directory? ✓
- ▶ Can I have a Domino container partitioned server?

Can I have a Domino container partitioned server?

- ▶ Currently every Domino server needs it's own unique IP address
- ▶ You could achieve this by adding multiple IP addresses to the host and forwarding the ports to containers on a specific IP address
- ▶ A better solution is this:



Can I have a Domino partitioned server?

- ▶ This works fine for HTTP(s), SMTP and LDAP
- ▶ However, a NRPC proxy does not **yet** exist
- ▶ The NRPC protocol is proprietary
- ▶ Best is if HCL would create this proxy
- ▶ If you agree that they should, please vote for this idea



Frequently Asked Questions

- ▶ I'm a Linux newbie. How do I start with this? ✓
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- ▶ Can I automate that? ✓
- ▶ How do I add custom packages to the Domino program directory? ✓
- ▶ Can I have a Domino container partitioned server? ✓

Upgrading an existing server

- ▶ This is really simple!
- ▶ Get the latest version of the startscript:
git clone <https://github.com/nashcom/domino-startscript.git>
- ▶ Install the container environment
/local/github/domino-startscript/install_container_env.sh
- ▶ Create or pull a Domino container image
e.g. docker pull harbor.martdj.nl/hclcom/domino:latest
- ▶ Edit your configuration
dominoctl cfg
- ▶ Stop domino
domino stop
- ▶ Start your Domino container
dominoctl start
- ▶ Uninstall your native Domino installation
and "rm /usr/bin/domino"



Fool your colleagues

- ▶ If they're used to using the domino command:
echo "alias domino=dominoctl" >> ~/.bash_profile
- ▶ They can use Domino the way they're used to
- ▶ They probably won't realise that they're running a Domino container now!

How about upgrading?

- ▶ How about doing that in less than a minute?
- ▶ Pull the latest image
- ▶ `dominoctl update`
- ▶ The upgrade takes the time to stop and start the server...



Questions?



More information



▶ <https://blog.martdj.nl>

Martijn's Blog

A technical blog about HCL Connections, HCL Domino and other stuff



The screenshot shows the homepage of Martijn's Blog. At the top, there is a navigation menu with links for Home, Resources, Links, About, and Contact. Below the menu is a large header image featuring interlocking gears. A secondary navigation bar contains a search box and an 'About This Site' link. The main content area displays a featured article titled 'Enabling SNMP for Domino - Revisited', posted on March 24, 2024, by martij. To the left of the article is a promotional banner for 'engage' with the text 'I'm presenting at Engage 2024. Join us, and come to my session! April 22-24 Antwerp, Belgium'. A 'Tags' section is visible on the right side of the page.

Select tag domino-docker

▶ <https://blog.nashcom.de>

The screenshot shows an article from Daniel Nashed's Blog titled 'Linux - Using Cron to schedule periodic jobs like certificate updates'. The article is dated 10 April 2024 09:38:27. The author's profile picture and name 'Daniel Nashed' are visible. The article text discusses the use of cron for scheduling certificate updates in Linux. It mentions that the author has never looked into cron before but found it to be a straightforward functionality. The article provides a link to a GitHub repository for a certificate update script and notes that the author did not automate it to end to end yet. A quick look into /etc/crontab is mentioned. The article also notes that the author added Certificate URL Health on certstore.nsf on top and that this should automatically pull updated certs from certstore.nsf daily and update the NGINX config. The article is signed off as '-- Daniel'. A code block at the bottom shows environment variables: SHELL=/bin/bash, PATH=/sbin:/bin:/usr/sbin:/usr/bin, and MAILTO=root.