Oracle 18c XE auf Oracle Linux 7

Preface

Oracle Linux (OL, formerly known as Oracle Enterprise Linux) is a Linux distribution packaged and freely distributed by Oracle. It is compiled from Red Hat Enterprise Linux (RHEL) source code, replacing Red Hat branding with Oracle's. Users can freely download Oracle Linux through Oracle's E-delivery service (Oracle Software Delivery Cloud) or from a variety of mirror sites, and can deploy and distribute it without cost.

Oracle Database 18c Express (XE) is a free to use for in-house applications. If you have a tight budget but the limits are acceptable you may consider XE on OL for your BPS schema.

The limits of XE are:

- Up to 12 GB of user data
- Up to 2 GB of database RAM
- Up to 2 CPU threads
- Up to 3 Pluggable Databases
- No support by Oracle, but community support available
- No patches from Oracle

In this tutorial linux and oracle are installed in a virtual machine under VMware Workstation 15 Player. Oracle VM VirtualBox should also work, probably with small modifications.

Installation

Download Linux ISO

Download Oracle Linux from https://edelivery.oracle.com

- Sign In with your oracle credentials
- Search for „Oracle Linux“
- Add „DLP: Oracle Linux 7.7.0.0.0 (Oracle Linux)“ to cart
- Checkout and select „x86 64 bit“ as platform
- Accept license terms
- Download „V983339-01.iso Oracle Linux Release 7 Update 7 for x86 (64 bit), 4.4 GB“

Create Virtual Machine

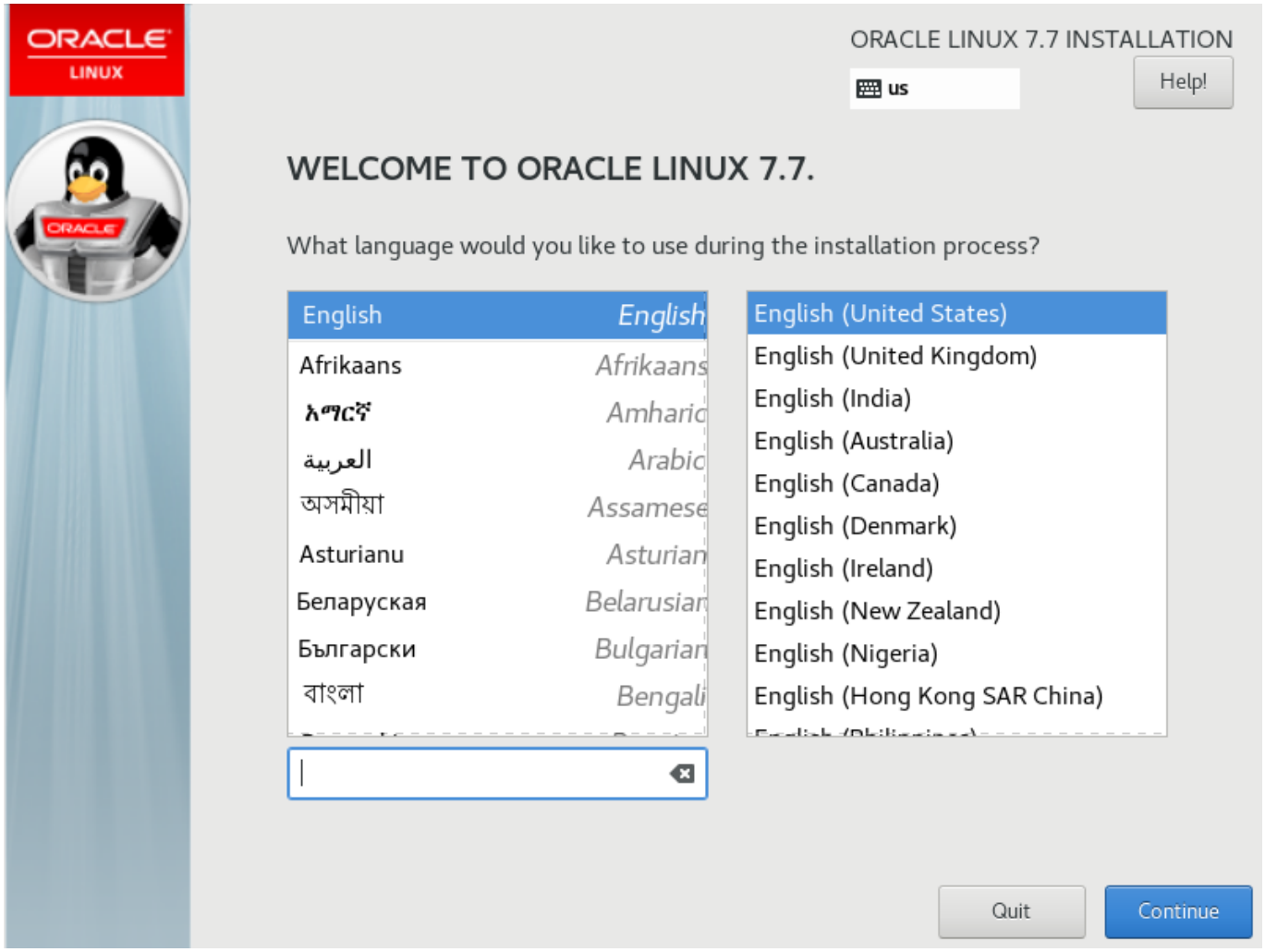
Start VMware Workstation 15 Player

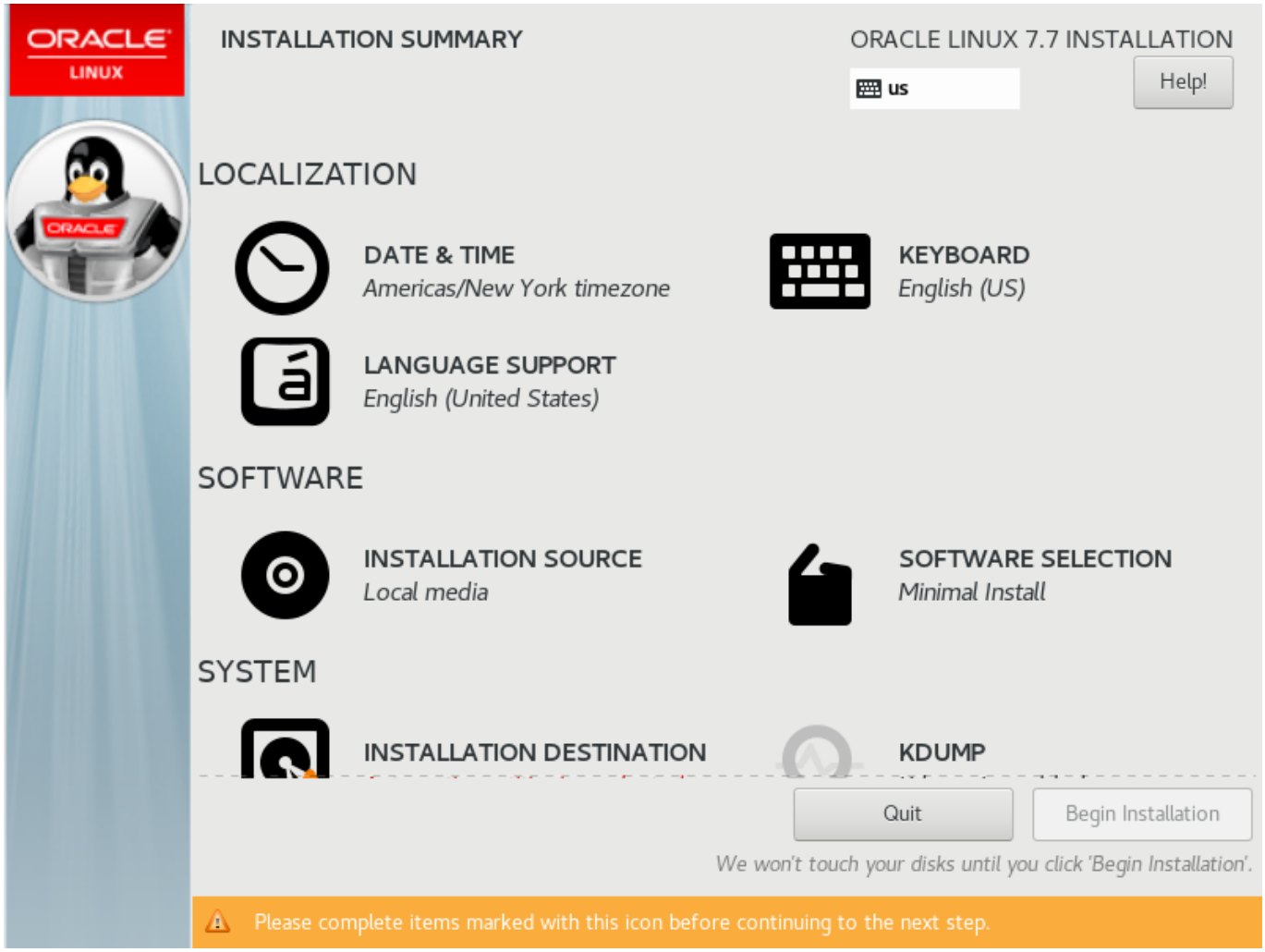
- Create a New Virtual Machine
- Installer Disc image file (iso): V983339-01.iso
- Virtual machine name: vmora18

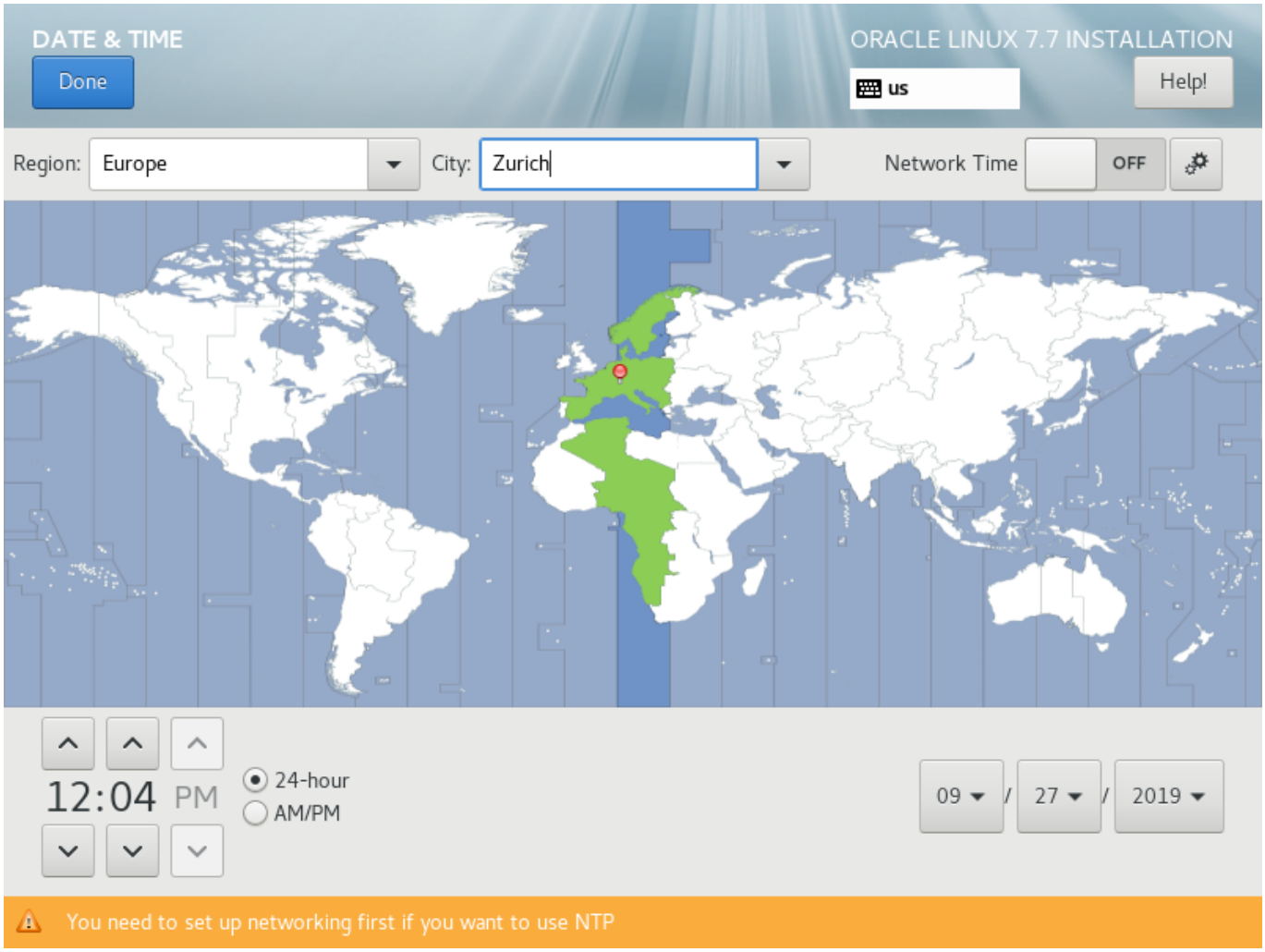
- Location: E:\VM\vmora18
- Maximum disk size (GB): 120
- Store virtual disk as a single file
- Customize Hardware
    - Memory: 2 GB
    - Processors: 2
    - Network Adapter: Bridged
- Power on this virtual machine after creation

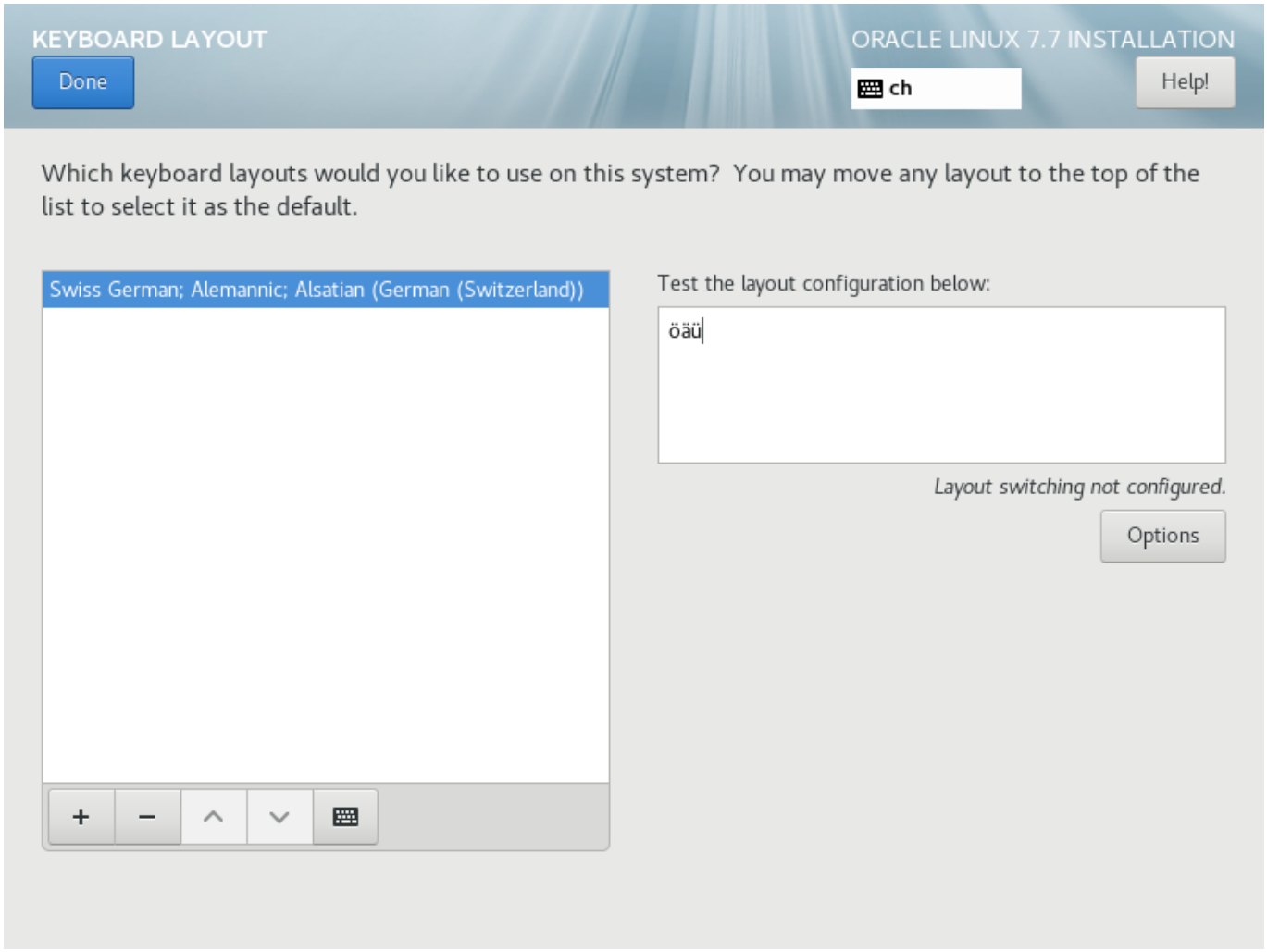
Install Linux

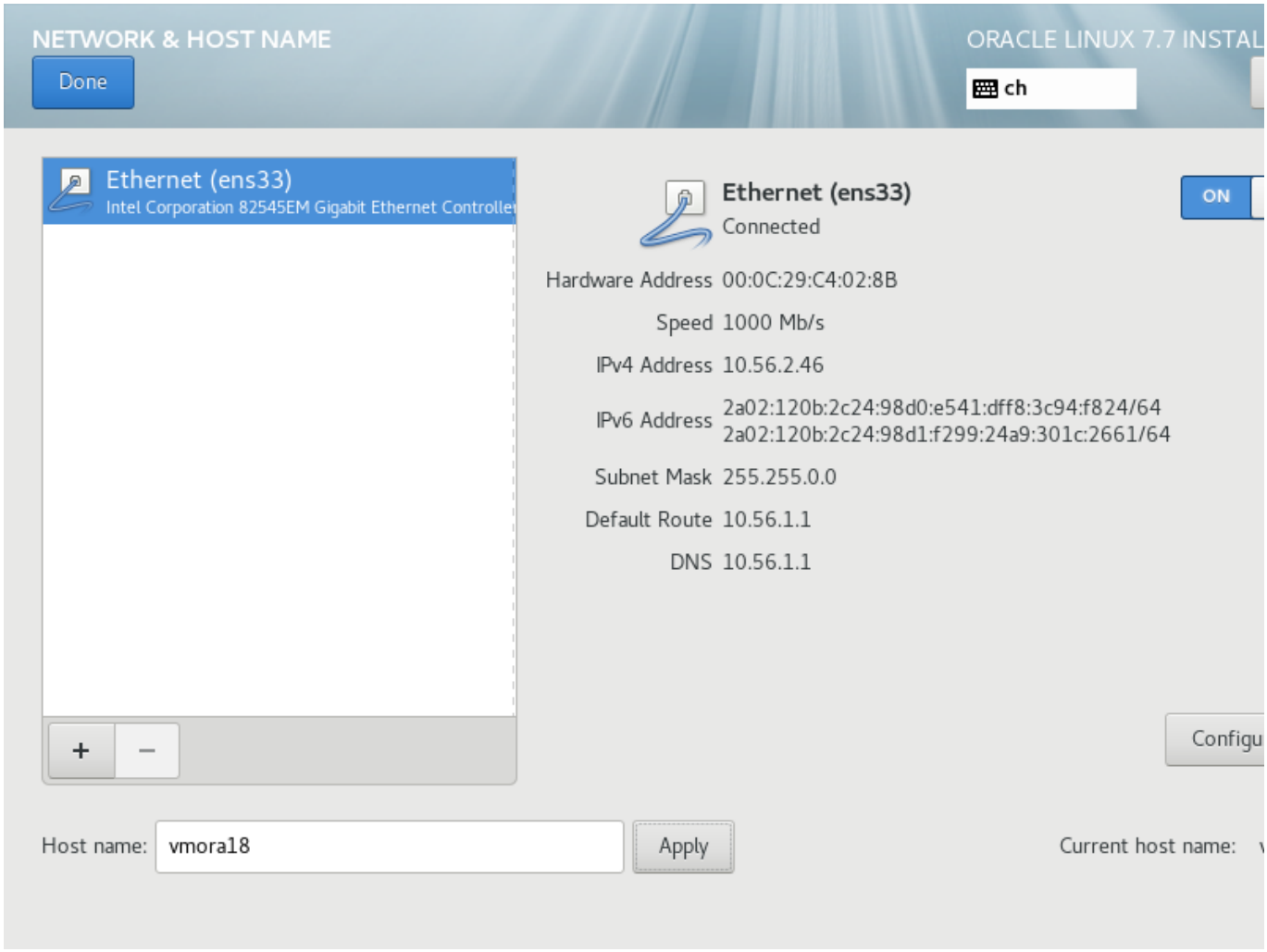
Show all config steps

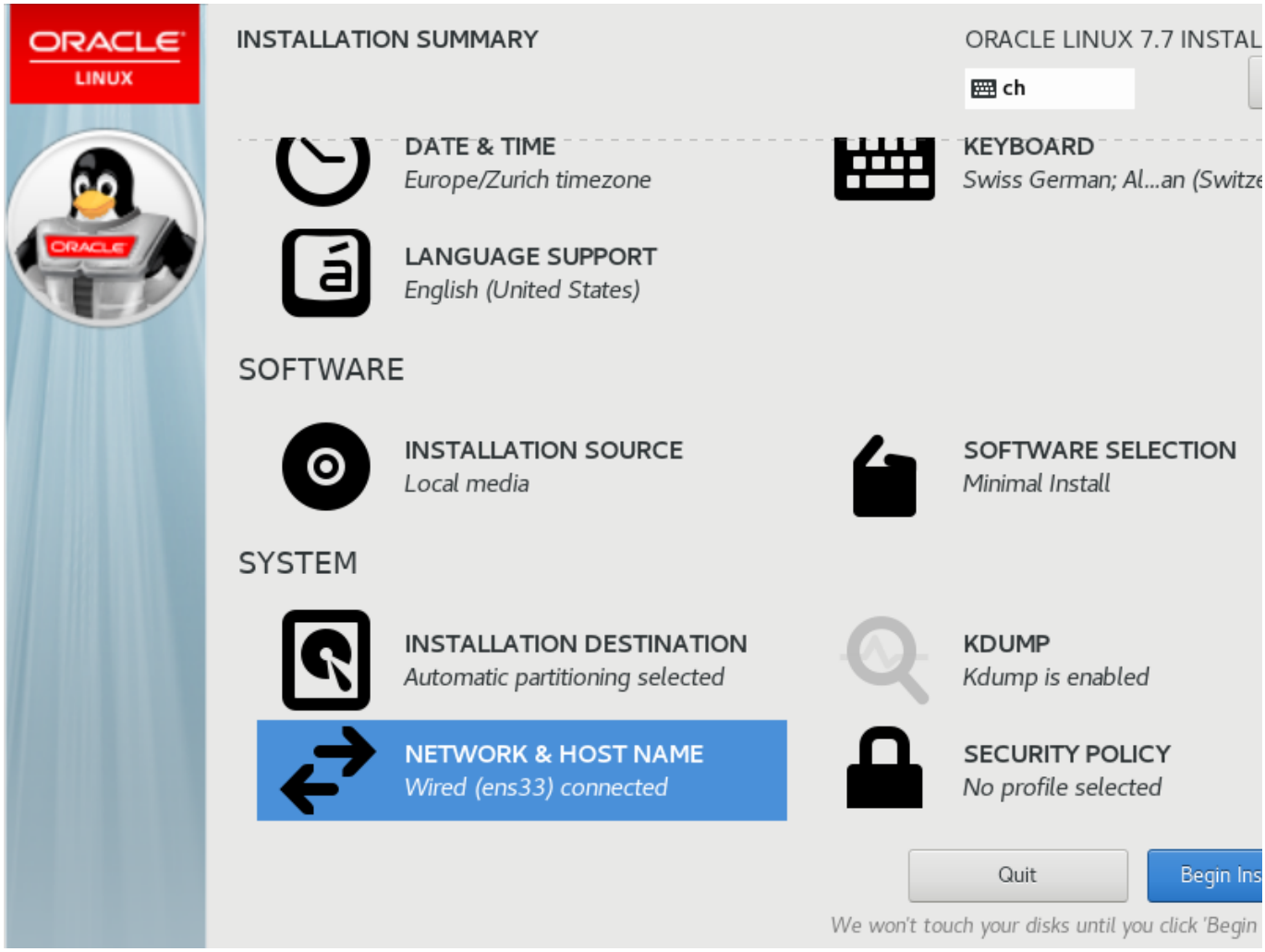

ORACLE LINUX
ORACLE LINUX 7.7 INSTALLATION
us
Help!
WELCOME TO ORACLE LINUX 7.7.
What language would you like to use during the installation process?
English English
Afrikaans Afrikaans
አማርኛ Amharic
العربية Arabic
অসমীয়া Assamese
Asturianu Asturian
Беларуская Belarusian
Български Bulgarian
বাংলা Bengali
English (United States)
English (United Kingdom)
English (India)
English (Australia)
English (Canada)
English (Denmark)
English (Ireland)
English (New Zealand)
English (Nigeria)
English (Hong Kong SAR China)
Quit
Continue

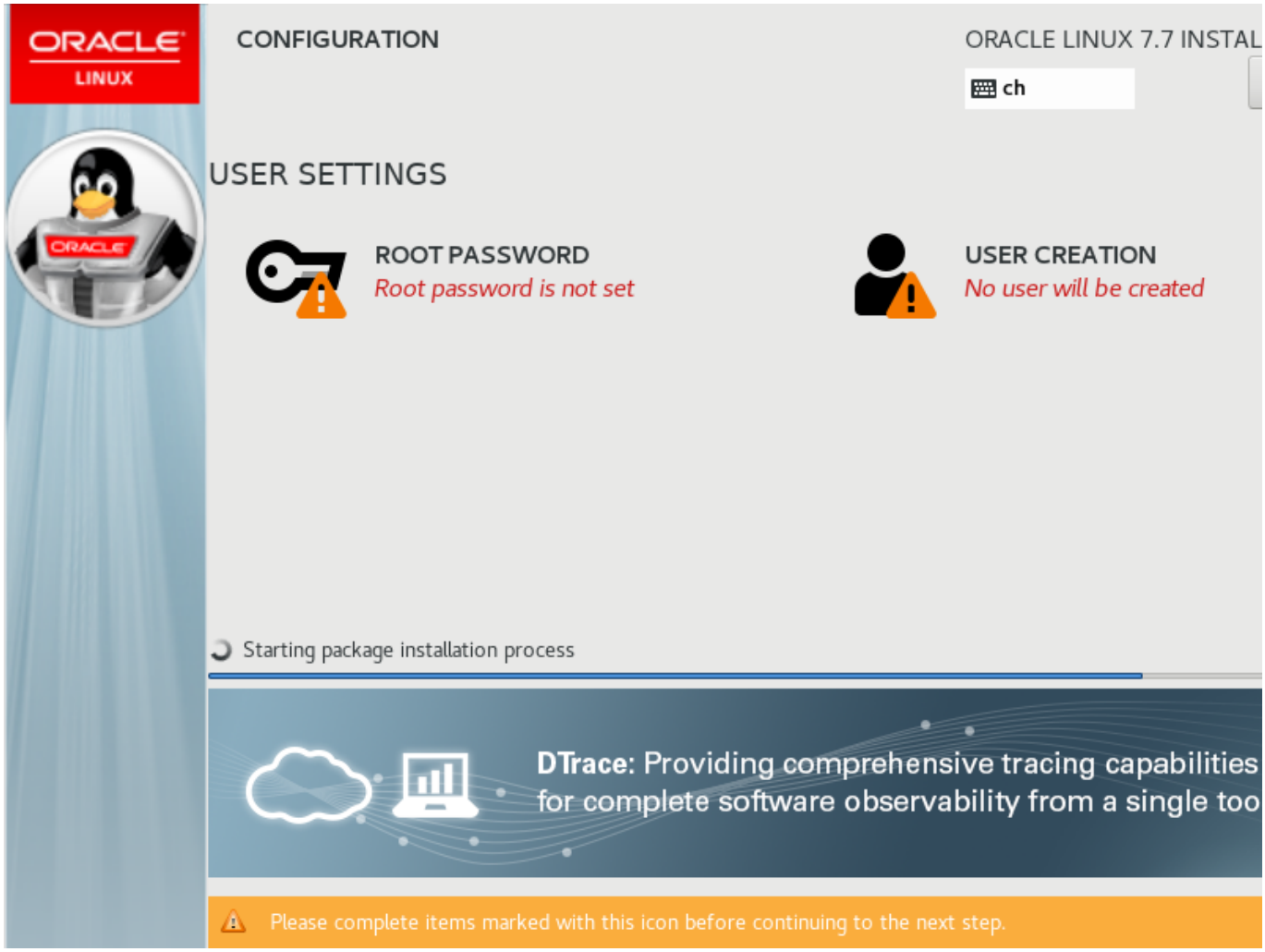

ORACLE
LINUX
INSTALLATION SUMMARY
ORACLE LINUX 7.7 INSTALLATION
us
Help!
LOCALIZATION
DATE & TIME
Americas/New York timezone
KEYBOARD
English (US)
LANGUAGE SUPPORT
English (United States)
SOFTWARE
INSTALLATION SOURCE
Local media
SOFTWARE SELECTION
Minimal Install
SYSTEM
INSTALLATION DESTINATION
KDUMP
Quit
Begin Installation
We won't touch your disks until you click 'Begin Installation'.
Please complete items marked with this icon before continuing to the next step.

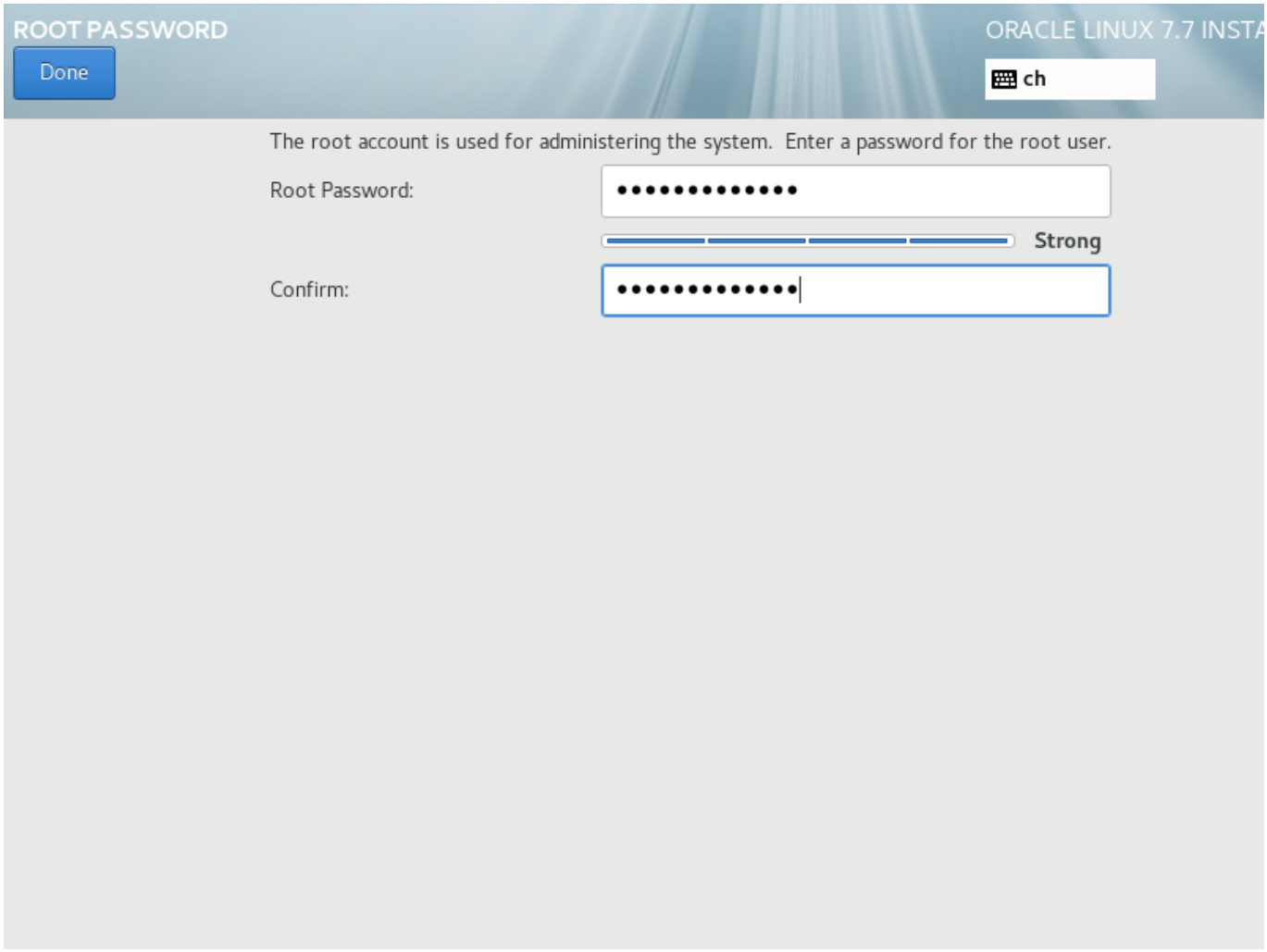

DATE & TIME
Done
ORACLE LINUX 7.7 INSTALLATION
us
Help!
Region: Europe
City: Zurich
Network Time
OFF
12:04 PM
24-hour
AM/PM
09 / 27 / 2019
You need to set up networking first if you want to use NTP

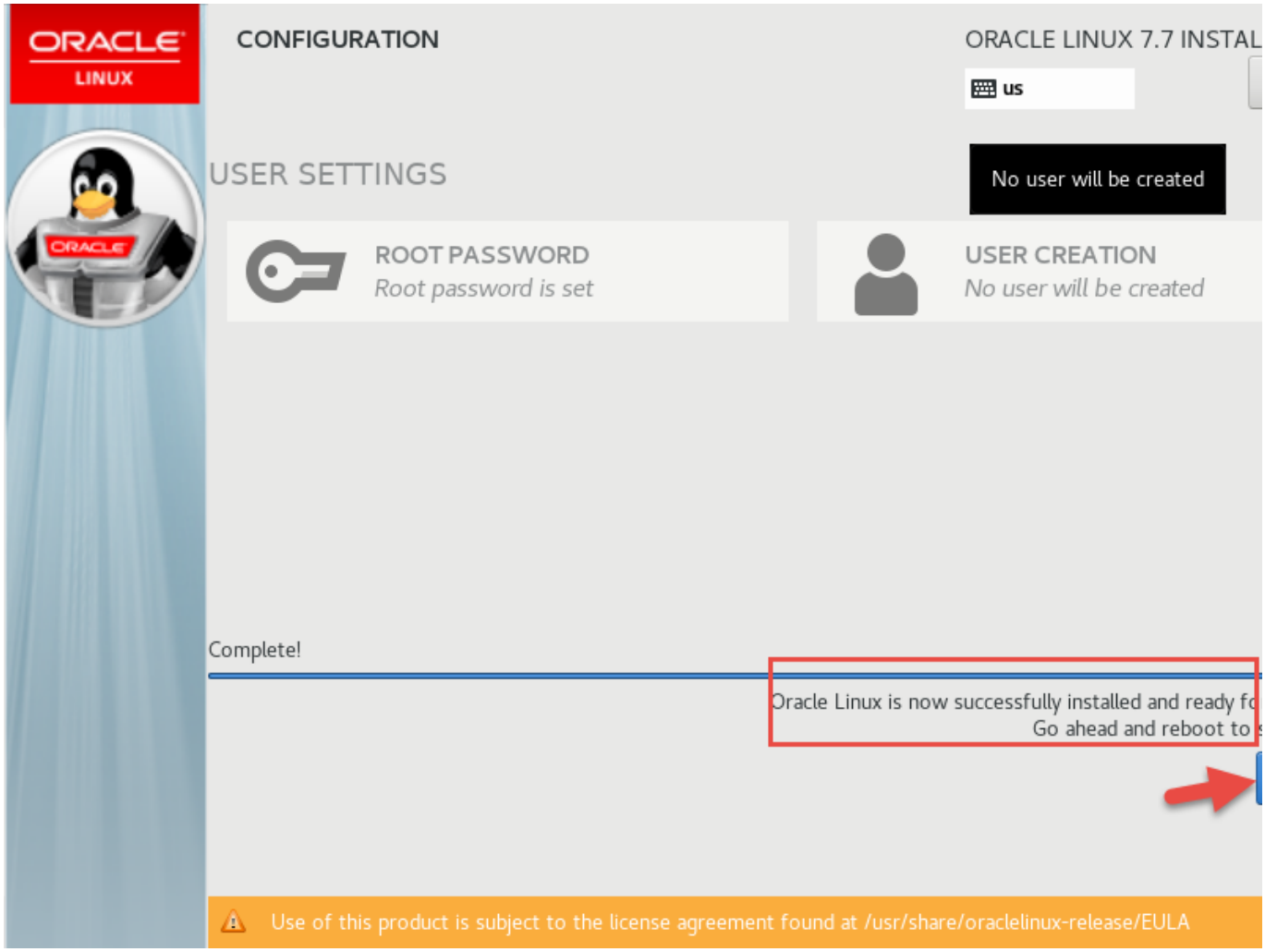

KEYBOARD LAYOUT
Done
ORACLE LINUX 7.7 INSTALLATION
ch
Help!
Which keyboard layouts would you like to use on this system? You may move any layout to the top of the list to select it as the default.
Swiss German; Alemannic; Alsatian (German (Switzerland))
Test the layout configuration below:
öäü
Layout switching not configured.
Options


NETWORK & HOST NAME
Done
ORACLE LINUX 7.7 INSTAL
ch
Ethernet (ens33)
Intel Corporation 82545EM Gigabit Ethernet Controller
Ethernet (ens33)
Connected
ON
Hardware Address 00:0C:29:C4:02:8B
Speed 1000 Mb/s
IPv4 Address 10.56.2.46
IPv6 Address 2a02:120b:2c24:98d0:e541:dff8:3c94:f824/64
2a02:120b:2c24:98d1:f299:24a9:301c:2661/64
Subnet Mask 255.255.0.0
Default Route 10.56.1.1
DNS 10.56.1.1
+
−
Configu
Host name: vmora18
Apply
Current host name:


ORACLE
LINUX
INSTALLATION SUMMARY
ORACLE LINUX 7.7 INSTAL
ch
DATE & TIME
Europe/Zurich timezone
KEYBOARD
Swiss German; Al...an (Switze
LANGUAGE SUPPORT
English (United States)
SOFTWARE
INSTALLATION SOURCE
Local media
SOFTWARE SELECTION
Minimal Install
SYSTEM
INSTALLATION DESTINATION
Automatic partitioning selected
KDUMP
Kdump is enabled
NETWORK & HOST NAME
Wired (ens33) connected
SECURITY POLICY
No profile selected
Quit
Begin Ins
We won't touch your disks until you click 'Begin


ORACLE
LINUX
CONFIGURATION
ORACLE LINUX 7.7 INSTAL
ch
USER SETTINGS
ROOT PASSWORD
Root password is not set
USER CREATION
No user will be created
Starting package installation process
DTrace: Providing comprehensive tracing capabilities
for complete software observability from a single too
Please complete items marked with this icon before continuing to the next step.


ROOT PASSWORD
Done
ORACLE LINUX 7.7 INSTA
ch
The root account is used for administering the system. Enter a password for the root user.
Root Password:
Strong
Confirm:



Update and DB Preinstall

Open a ssh terminal to „vmora18“ and login as root with the password defined before.

Update the software:

```
yum -y update
```

Run Oracle 18c preinstall:

```
yum -y install oracle-database-preinstall-18c
```

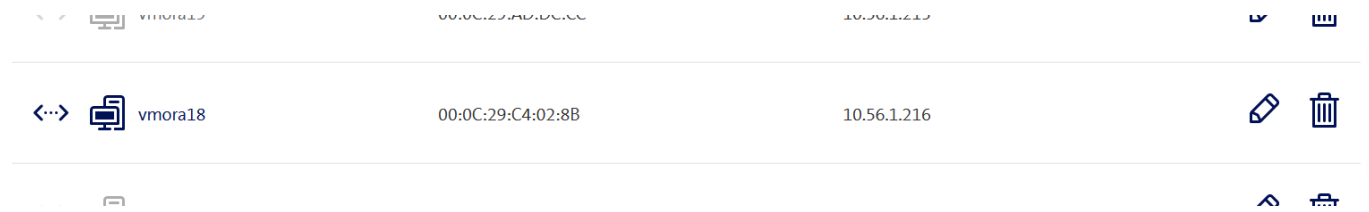
Install utilities:

```
yum -y install nano wget
```

Set a password for user „oracle“ so we can login:

```
passwd oracle
```

Optional: Assign a fixed IP in Swisscom Router



Reboot:

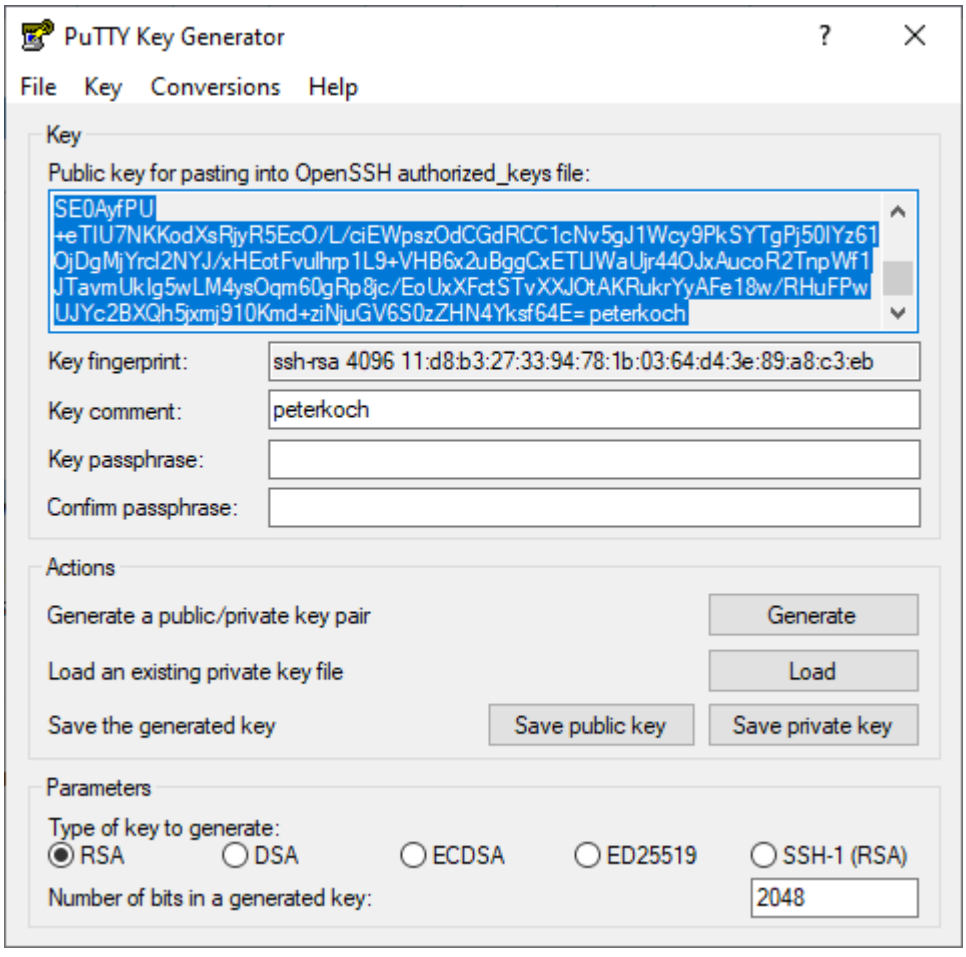
```
reboot
```

Setup SSH key auth for root

Create ~/.ssh and key

```
ssh-keygen -t rsa -b 4096
    <enter>
    <enter>
    <enter>
```

Load my personal key in PuTTYgen, and copy public key to the clipboard



Add my personal key to authorized keys:

```
nano ~/.ssh/authorized_keys
<paste>
```

Turn of password auth for ssh:

```
nano /etc/ssh/sshd_config
...
PasswordAuthentication no
...
```

Restart ssh:

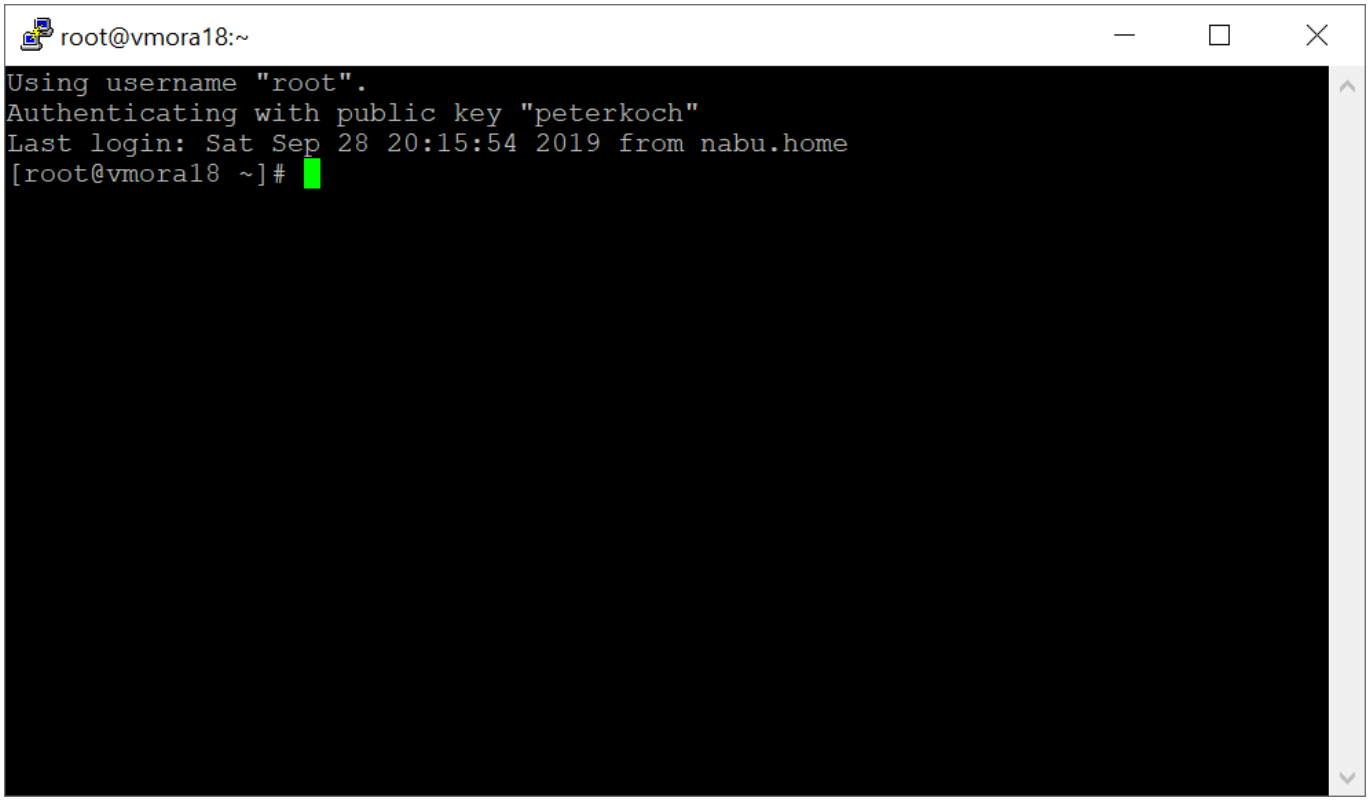
```
service sshd restart
```

Leave SSH terminal yet open in case.

Create and test PuTTY session for root:

- Session
  - Host Name: vmora18
  - Port: 22 / SSH
- Connection
  - Data
    - Auto-login username: root
  - SSH
    - Auth
      - Private key file: (location of my ppk)
- Session
  - Saved sessions: vmora18 - root
  - Save

Test if autologin successful



Motd Logo

Create logo at http://www.network-science.de/ascii/

- Text: vmora18
- Font: slant
- Reflection: no
- Adjustment: center
- Stretch: no
- Width: 80
- do it!

Copy logo to clipboard, and paste to motd

```
nano /etc/motd
<paste>
```

Install rlwrap for cursor keys in sqlplus

```
wget https://dl.fedoraproject.org/pub/epel/epel-release-latest-7.noarch.rpm
rpm -ivh epel-release-latest-7.noarch.rpm
yum -y install rlwrap
```

Make SELinux permissive

```
nano /etc/selinux/config
```

```
...
SELINUX=permissive
```

```
setenforce Permissive
```

Disable firewall

```
systemctl stop firewalld
systemctl disable firewalld
```

Enable SSH Login for User oracle

Similar as for root

```
su oracle
```

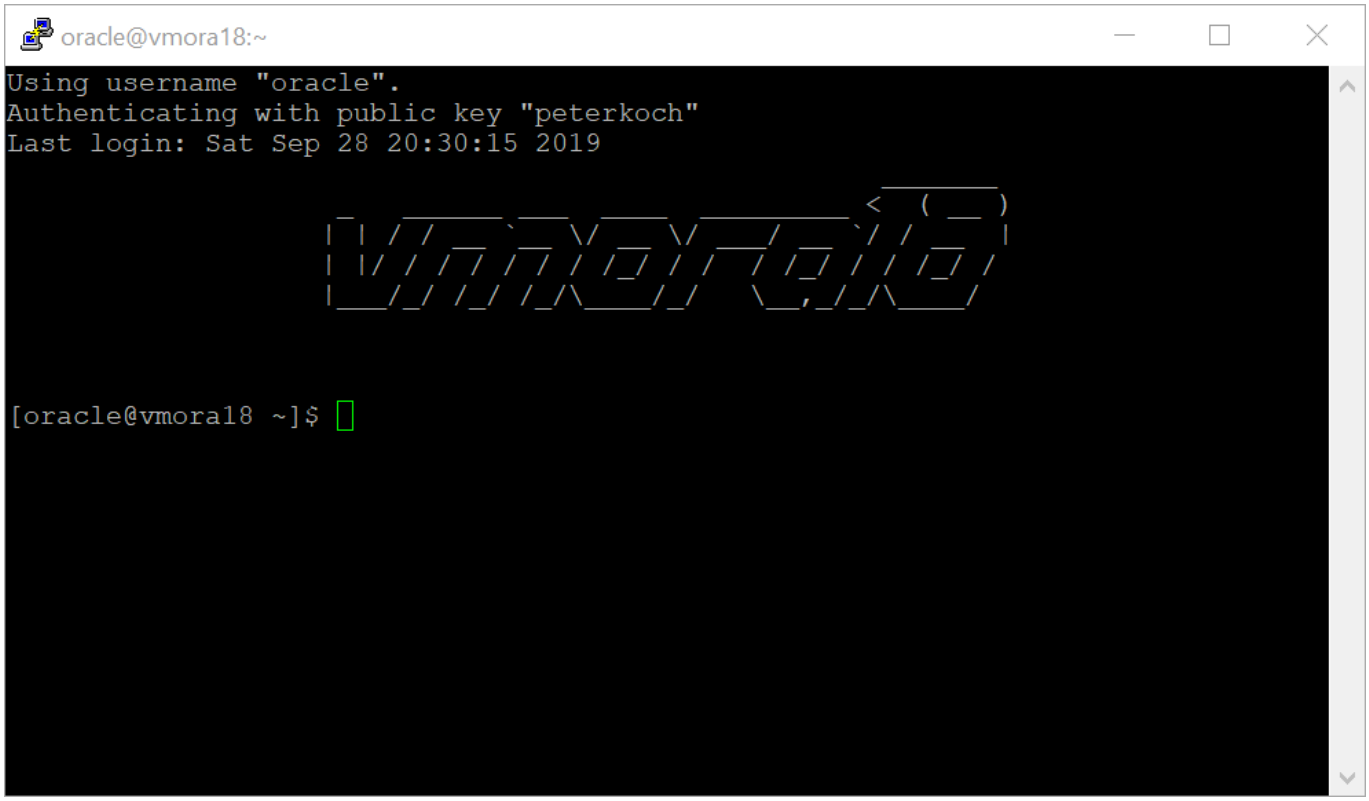
```
ssh-keygen -t rsa -b 4096
    <enter>
    <enter>
    <enter>
```

```
nano ~/.ssh/authorized_keys
<paste my personal public key>
```

Create PuTTY Session

- Load session „vmora19 - root“
- Change auto-login username: oracle
- Save session as „vmora19 - oracle“

Test if working



Append to .bash_profile:

~/.bash_profile

```
export ORACLE_SID=XE
export ORAENV_ASK=NO
. /opt/oracle/product/18c/dbhomeXE/bin/oraenv
alias sqlplus="rlwrap sqlplus"
```

```
exit
reboot
```

Get Oracle 18c Express Software

Download software:

- https://www.oracle.com/database/technologies/xe-downloads.html
- Click: Oracle Database 18c Express Edition for Linux x64
- Accept license agreement
- Click „Download“ button
- Login with your oracle credentials
- Save file on your desktop PC

Use Filezilla to connect as root with SFTP/SSH, then upload oracle-database-xe-18c-1.0-1.x86_64.rpm to /root

Install DB software and create database

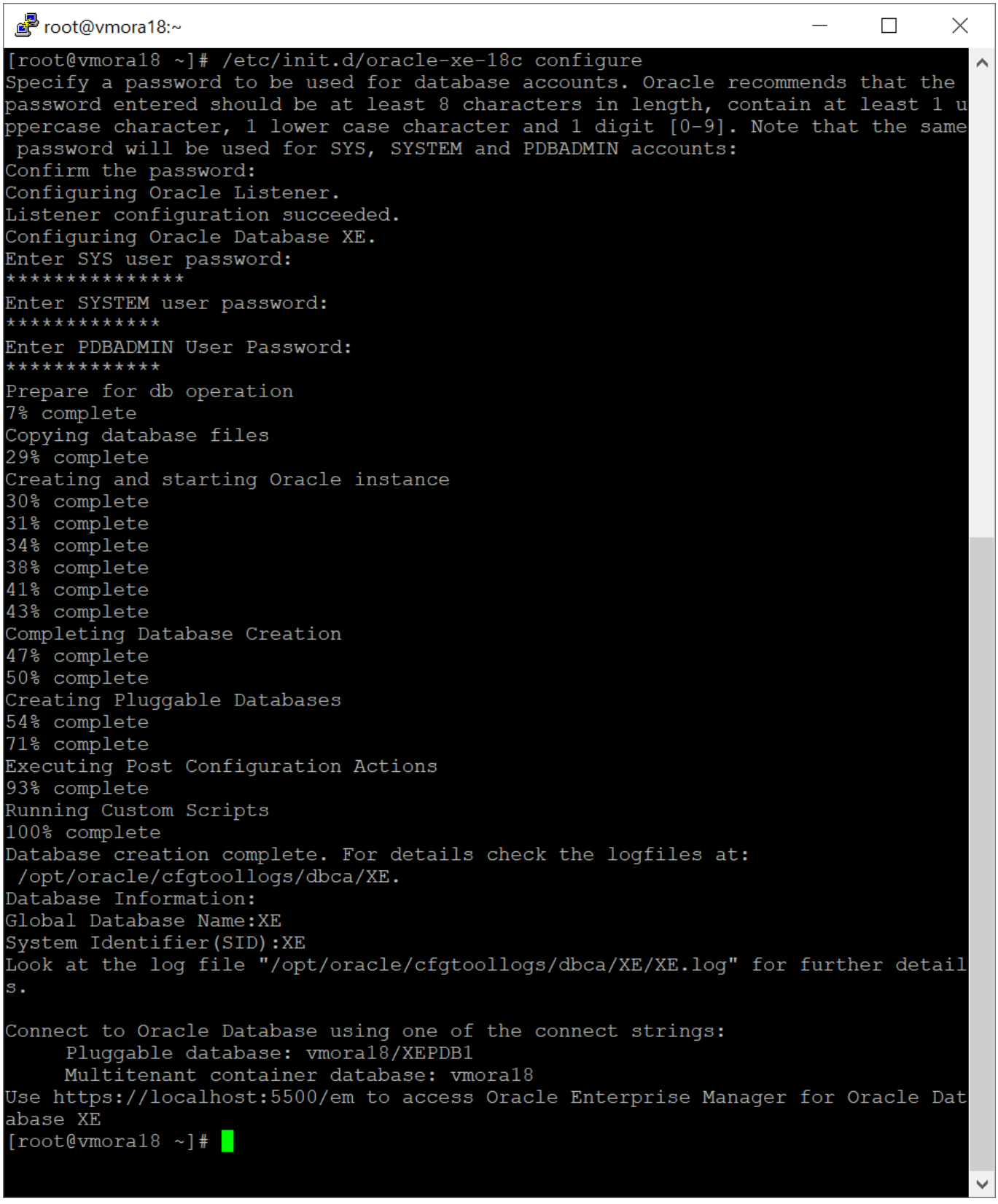
Install the software:

```
yum -y localinstall oracle-database-xe-18c-1.0-1.x86_64.rpm
```

Create the database:

```
/etc/init.d/oracle-xe-18c configure
```

- Enter password for sys, system and pdbadmin 2x



Post-installaton steps

As root

Edit /etc/oratab and set the restart flag 'Y' to have XE started by dbstart:

```
nano /etc/oratab
...
XE:/opt/oracle/product/18c/dbhomeXE:Y
...
```

As oracle

Make sure the PDB starts when the instance starts.

```
sqlplus / as sysdba
--
alter pluggable database xepdb1 open;
alter pluggable database xepdb1 save state;
```

Automating Database Startup and Shutdown

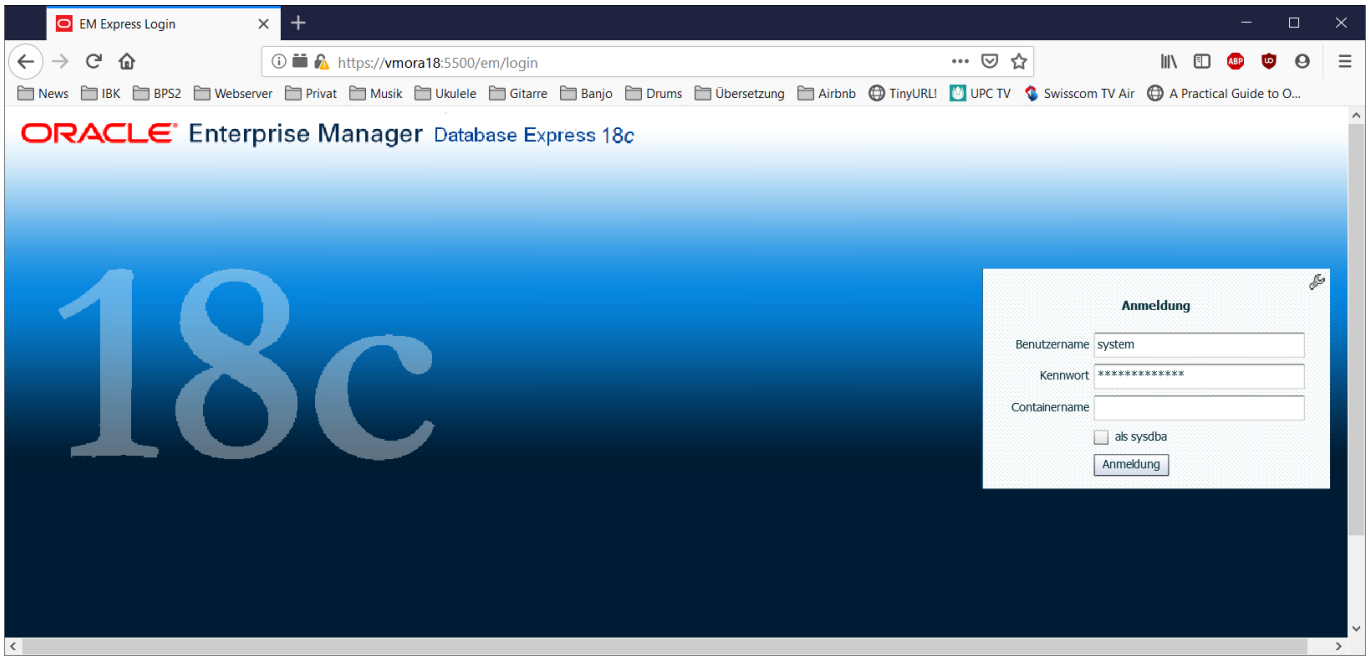
```
systemctl daemon-reload
systemctl enable oracle-xe-18c
```

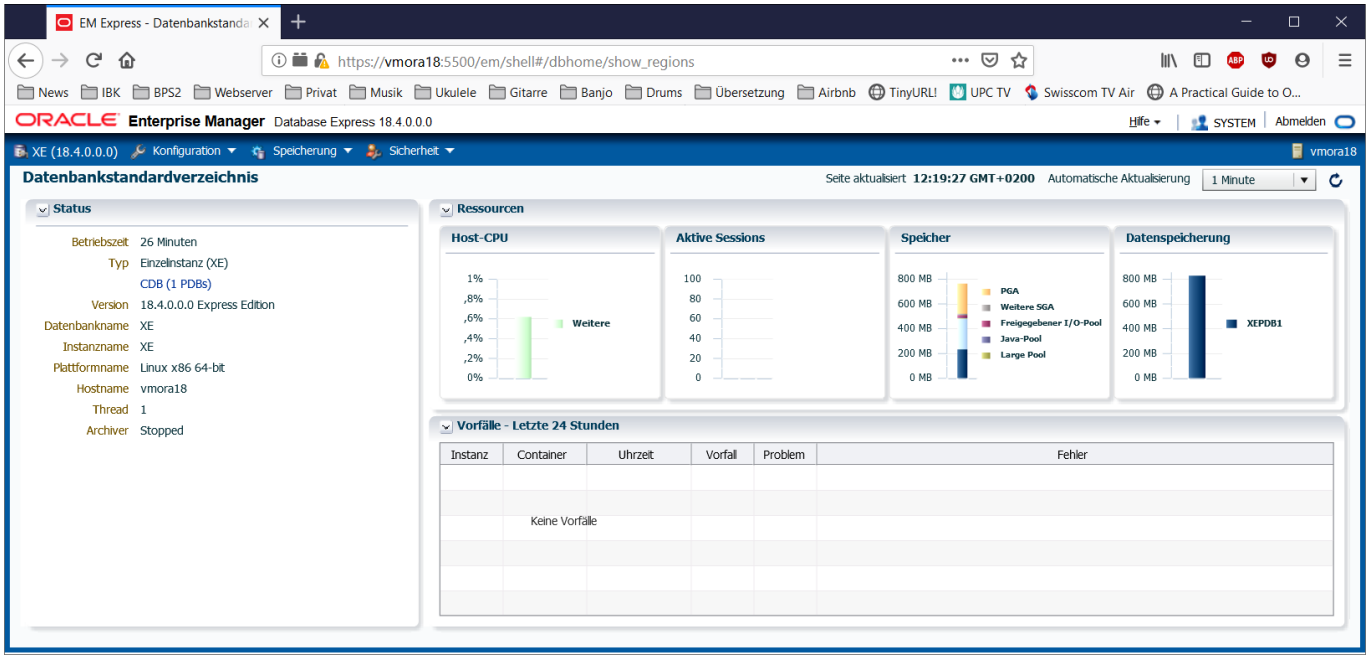
Enable Enterprise Manager Express

As oracle:

```
sqlplus / as sysdba
--
exec dbms_xdb_config.sethttpsport(5500);
```

Test in browser





Administration

Create tablespaces in xepdb1

```
sqlplus / as sysdba
```

Create and list tablespaces

```
ALTER SESSION SET CONTAINER = xepdb1;
CREATE TABLESPACE lu_agrar_dat  DATAFILE
'/opt/oracle/oradata/XE/XEPDB1/lu_agrar_dat.dbf' SIZE 10M  AUTOEXTEND ON
NEXT 10M;
CREATE TABLESPACE lu_agrar_inx  DATAFILE
'/opt/oracle/oradata/XE/XEPDB1/lu_agrar_inx.dbf' SIZE 10M  AUTOEXTEND ON
NEXT 10M;
SELECT TABLESPACE_NAME, STATUS, CONTENTS FROM DBA_TABLESPACES;

TABLESPACE_NAME                STATUS    CONTENTS
------------------------------ --------- ---------------------
SYSTEM                         ONLINE    PERMANENT
SYSAUX                         ONLINE    PERMANENT
UNDOTBS1                       ONLINE    UNDO
TEMP                           ONLINE    TEMPORARY
USERS                          ONLINE    PERMANENT
LU_AGRAR_DAT                   ONLINE    PERMANENT
LU_AGRAR_INX                   ONLINE    PERMANENT
7 rows selected.
```

Check new tablespaces are available in xepdb1 only

```
ALTER SESSION SET CONTAINER = CDB$ROOT;
SELECT TABLESPACE_NAME, STATUS, CONTENTS FROM DBA_TABLESPACES;

TABLESPACE_NAME                STATUS    CONTENTS
------------------------------ --------- --------------------
SYSTEM                         ONLINE    PERMANENT
SYSAUX                         ONLINE    PERMANENT
UNDOTBS1                       ONLINE    UNDO
TEMP                           ONLINE    TEMPORARY
USERS                          ONLINE    PERMANENT
```

Drop tablespaces in xepdb1

```
sqlplus / as sysdba
```

List and drop tablespaces

```
ALTER SESSION SET CONTAINER = xepdb1;
SELECT TABLESPACE_NAME, STATUS, CONTENTS FROM DBA_TABLESPACES;
DROP TABLESPACE lu_agrar INCLUDING CONTENTS AND DATAFILES;
```

TNSNAMES entry for clients

```
VMORA18 =
  (DESCRIPTION =
    (ADDRESS = (PROTOCOL = TCP)(HOST = vmora18)(PORT = 1521))
    (CONNECT_DATA =
      (SERVER = DEDICATED)
      (SERVICE_NAME = xepdb1)
    )
  )
```

Monitor Used Space

Monitoring the used space is important on XE, since you don't want to run into the maximum 12 GB limit!

What counts to the XE space limit of 12 GB is somewhat unclear for me. Oracle says **USER DATA**. So the default sys-, undo- and temporary tablespaces are probably unconsidered. Since I am not completely sure about this, I count all data visible in cdb_data_files.

Connect

```
sqlplus / as sysdba
```

Check used space per tablespace:

```
select tablespace_name, round(bytes/1024/1024) MB,
round(bytes/1024/1024/1024,3) GB from cdb_data_files;
```

Sample output:

```
TABLESPACE_NAME                          MB         GB
------------------------------ ---------- ----------
USERS                                     5       .005
UNDOTBS1                                 65       .063
SYSTEM                                  840        .82
SYSAUX                                  580       .566
SYSTEM                                  290       .283
SYSAUX                                  430        .42
UNDOTBS1                                220       .215
USERS                                     5       .005
LU_AGRAR_DAT                             50       .049
LU_AGRAR_INX                             50       .049
```

If you just want the summary of user data:

```
select round(sum(bytes)/1024/1024) MB, round(sum(bytes)/1024/1024/1024,3) GB
from cdb_data_files
where tablespace_name not like 'SYS%' and tablespace_name not like 'UNDO%';
```

Sample output:

```
        MB         GB
---------- ----------
      2535      2.476
```

Disable Password Expire

You may vant to disable password expire at least for system and the BPS superuser.

As system, check used profiles:

```
select profile from DBA_USERS where username = 'SYSTEM';
select profile from DBA_USERS where username = 'LU_AGRAR';
```

Check settings of the profiles, for example the DEFAULT profile:

```
select resource_name,limit from dba_profiles where profile='DEFAULT';
```

Set to unlimited:

```
alter profile DEFAULT limit password_life_time UNLIMITED;
```