

10. Introduction to Oracle Database Administration. Install Oracle database software and create a database.

1.1. Introduction to Oracle Database Administration.

The Oracle Database Management Systems course is designed to teach students how to perform the day-to-day administrative tasks required of an Oracle Database Administrator (DBA). No prior knowledge (or experience) in database management is required.

This course is specifically aimed at the following groups of Oracle database users:

- developers who want to acquire certain knowledge and skills in a short time;
- administrators who manage certain servers;
- Database administrators who manage Oracle databases for SMEs.

Relational databases.

Oracle Database is a relational database management system (RDBMS). A relational database uses links or two-dimensional tables to store information. The relational database model consists of three components: a set of objects or relationships (tables), a set of operators for managing tables and rules for data completeness.

For example, information about all employees in a company can be stored. In a relational database, several tables (such as a table of employees, a table of departments and a table of salaries) can be created to store different data for specific employees.

Oracle instance and database: Overview.

The Oracle instance contains memory structures known as the System Global Area (SGA) and Oracle background processes (Figure 10.1).

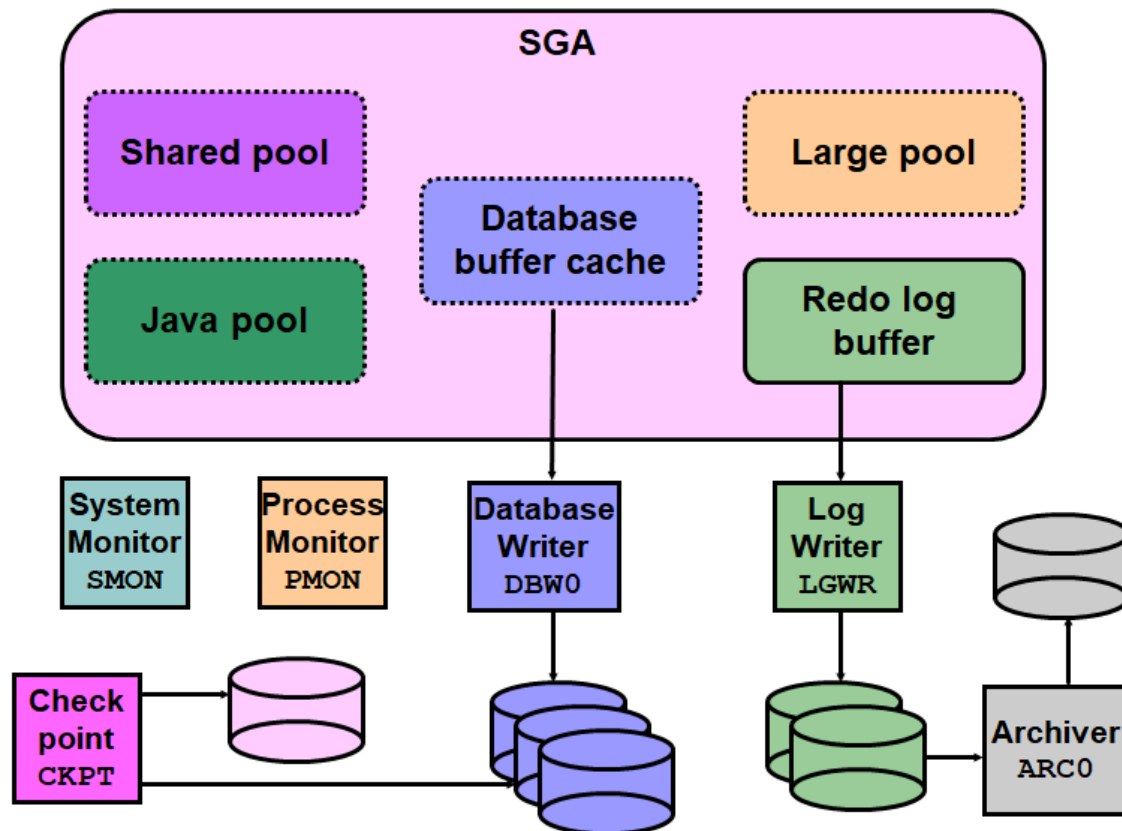


Figure 10.1. Oracle instance and Oracle database

The Oracle database contains data files, backup and redo action archive files, and control files.

Communication with the Oracle database server can be done via SQL (fig. 10.2.). The SQL statement is entered by the user or executed in a program. The statement is processed and the data is returned to the user.

Common tasks performed by a database administrator:

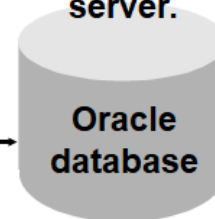
- installing and updating software for creating databases;
- performing database and software upgrades;
- starting and shutting down the user model (instance);
- management of database storage structures. consumer and security management;
- management of objects of the scheme (the structure of the database);

SQL statement is entered.

```
SELECT department_name  
FROM departments;
```

**The statement is sent to
the Oracle Database
server.**

DEPARTMENT_NAME
Administration
Marketing
Shipping
IT
Sales
Executive
Accounting
Contracting



**Data is retrieved and
returned to the user.**

Figure 10.2. Access to SQL database.

- backup and recovery when needed;
- proactive monitoring of the database and taking preventive or corrective action, if necessary;
- monitoring and setting up the software;
- Diagnose and report bugs in Oracle support structures.

In a small to medium database environment, only one person may be assigned to perform these tasks. In large enterprise environments, the work is often divided between several administrators, each with a specific area (for example, the database security administrator or the database setup expert).

Tools used to administer Oracle Database:

- Oracle Universal Installer (OUI);
- Database Configuration Assistant (DBCA);
- Database Upgrade Assistant (DBUA);
- Oracle Net Manager;
- Oracle Enterprise Manager, SQL * Plus;
- Recovery Manager (RMAN);
- Data Pump;
- SQL * Loader.

Tools used to administer Oracle Database.

The following tools are used for installation and upgrade:

- **Oracle Universal Installer (OUI)** - installs Oracle Database software and options. It can automatically start the Database Configuration Assistant to create a database.

- The Database Configuration Assistant (DBCA) creates a database of templates provided by Oracle. Another option is to create a user database. It allows you to copy a pre-configured database.

- The Database Upgrade Assistant (DBUA) guides the administrator through the upgrade of the existing database to a new version of Oracle.

Oracle Net Manager can be used to configure the user (Oracle Net) network.

The following tools are used to manage a specific Oracle instance and database:

- **Oracle Enterprise Manager:** Oracle Enterprise Manager combines a graphical console, agents, common services, and tools to provide an integrated and comprehensive platform for managing Oracle product management systems. After installing the Oracle database software, creating or upgrading a database, and configuring the network, Oracle Enterprise Manager can be used as a single user database management interface. In addition to providing a web-based user interface for executing SQL commands, it seamlessly interacts with other Oracle components that are used to administer a database (such as Recovery Manager and Scheduler). Enterprise Manager is used for all administrative management tasks.

- **SQL * Plus:** SQL * Plus is the commonly used command line interface for managing a user database.

- **Recovery Manager (RMAN):** RMAN is an Oracle tool that provides a complete solution for backing up and restoring a database as a whole or database files.

- **Data Pump:** Data Pump allows high-speed data transfer from one database to another. For example, you can export a table and import it into another database.

- **SQL * Loader:** The SQL * Loader utility allows you to load data from an external file into an Oracle database. This is one of several Oracle utilities that can be used to load data into database tables.

1.2. System requirements for installing Oracle database software and creating a database.

Using Oracle Universal Installer.

- Oracle Universal Installer (OUI) allows administrators to:
 - Review of Oracle software installed on a specific machine
 - installation of new Oracle software;

- Remove Oracle software that is no longer scheduled for use
- OUI provides online help.

The installation program automatically sets all the operating system environment variables that the Oracle database server requires for its operation.

It is good practice to set these variables in advance to facilitate the installation process.

The platform-specific Oracle Database Installation Guide is used for detailed information about all operating system configuration tasks that must be performed before installing Oracle Database software.

For UNIX:

When installing Oracle Database 11g Release 2 (11.2) (Table 10.1):

- minimum: 1 GB RAM
- Recommended: 2 GB RAM or more
- to determine the amount of RAM, enter the command
grep MemTotal / proc / meminfo

If the RAM size is smaller than the required size, more memory must be installed before proceeding.

Table 10.1. SWAP file:

Available RAM	Recommended SWAP file size
1-2 GB	1.5 times the amount of RAM
2-16 GB	Equal to the amount of RAM
More than 16 GB	16 GB

To determine if the system architecture can run specific software, the following command is entered:

```
# uname -m
```

This command shows the processor type. Verify that the processor architecture conforms to the version of Oracle installation software. If the expected output is not observed, incompatible software cannot be installed on this system.

answer:

```
# x86_64
```

To determine the size of the configured SWAP space, the following command is entered:

```
# grep SwapTotal / proc / meminfo
```

Answer:

```
SwapTotal: XXXXXX kB
```

If necessary, refer to the operating system documentation for information and instructions on how to configure additional swap space.

To determine the available RAM and swap space, enter the following command:

```
# free
```

Oracle recommends taking a few values for available RAM and swap space before finalizing a value. This is because the available RAM and replacement space continue to change depending on the user's interaction with the computer.

Starting with Oracle Database 11g, the automatic memory management feature requires more shared memory (/ dev / shm) and file descriptors. Shared memory must be at least as large as MEMORY_MAX_TARGET and MEMORY_TARGET for each instance of Oracle on this computer.

To determine the amount of shared memory available, enter the following command:

```
# df -h / dev / shm /
```

The following are the disk space requirements for installing Oracle Database 11g Release 2 (11.2) (Table 10.2.):

At least 1 GB of disk space in the / tmp directory

To determine the amount of available disk space in the / tmp directory, enter the following command:

```
# df -h / tmp
```

If less than 1 GB of free disk space is available in the / tmp directory, do one of the following:

- Unnecessary files from the / tmp directory are deleted to meet the free disk space requirement.

- TMP and TMPDIR environment variables are set when the oracle user environment is set.

To determine the amount of free disk space in the system, the following command is entered:

```
# df -h
```

Table 10.2.

Type of installation	Software file requirements
Enterprise Edition	4,7 GB
Standard Edition	4,6 GB
Type of installation	Data file requirements
Enterprise Edition	1,7 GB
Standard Edition	1,5 GB

If you want to configure automated backup, the recovery area requires additional disk space - either in a file system or in a group of disks in Oracle Automatic Storage Management.

Oracle Universal Installer performs system checks to verify that it meets the listed requirements. To ensure that these checks pass, the requirements are checked before starting the Oracle Universal Installer.

The certification matrix of the My Oracle Support website for the most up-to-date list of certified hardware platforms and operating system versions is reviewed:

<https://support.oracle.com/>

For the needs of this course in database management systems, a virtual machine Oracle Linux 7.6 64b with VMware workstation 10.0.2 / or newer / will be created, installed on Windows 10 Enterprise 64b.

1.3. Installing Oracle Linux 7.6 64b.

Oracle Linux 7 is about to be installed on VMware Workstation 10. Oracle Linux, formerly known as Oracle Enterprise Linux, is a Linux distribution based on Red Hat Enterprise Linux (RHEL).

Oracle Linux can be downloaded through Oracle's e-delivery service or from various sites and can be downloaded at no cost. Commercial technical support is available through the Oracle Oracle Linux support program.

The latest version of Oracle Linux from Oracle E-delivery / Oracle Software Delivery Cloud / is downloaded. The current version is Oracle Linux 7 Update-6.

Open VMware Workstation (12) -> File -> New virtual machine-> Standard installation / Typical / (fig. 10.3.). Forward.



Figure 10.3. Start the VMware Workstation.

Select the installation disk / image file and view the path to Oracle Linux 7 - ISO (fig. 10.4.). Forward.

If VMware does not recognize the type and version of the installation, you must manually set the type of installation (fig. 10.5.).

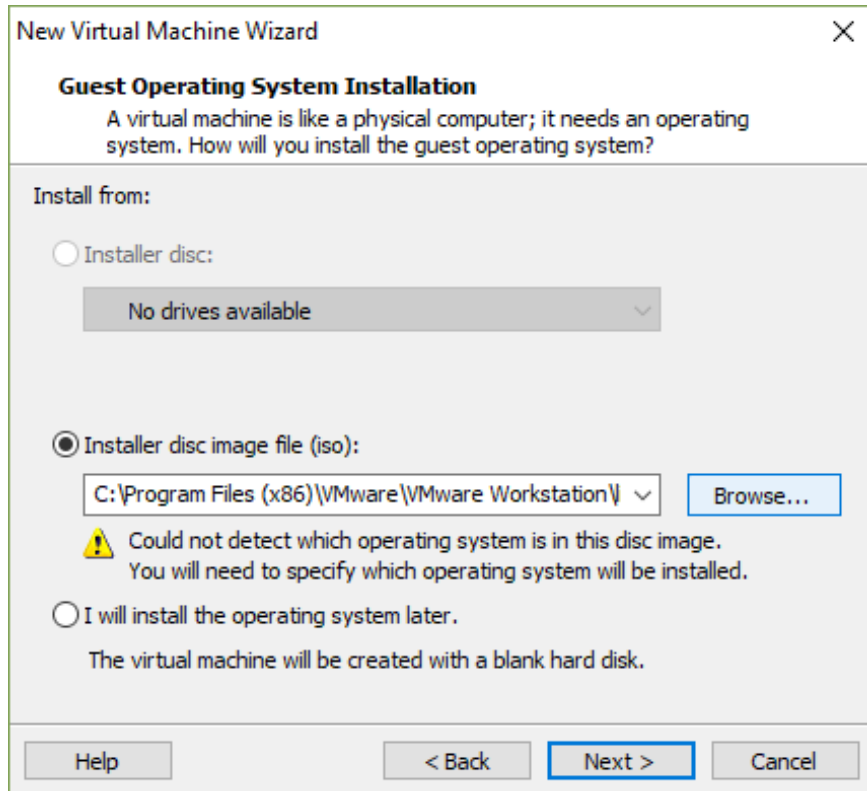


Fig.10.4. Selecting an installation disc.

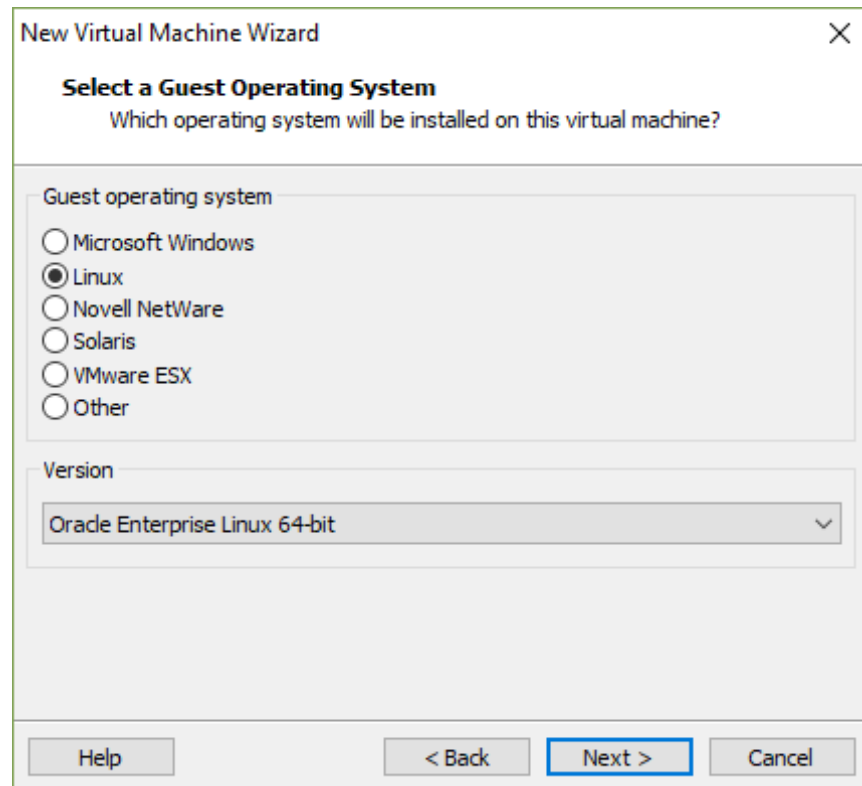


Fig.10.5. VMware. Type of installation.

Enter the name of the new virtual machine and view the place where it can be saved (fig. 10.6.). Forward.

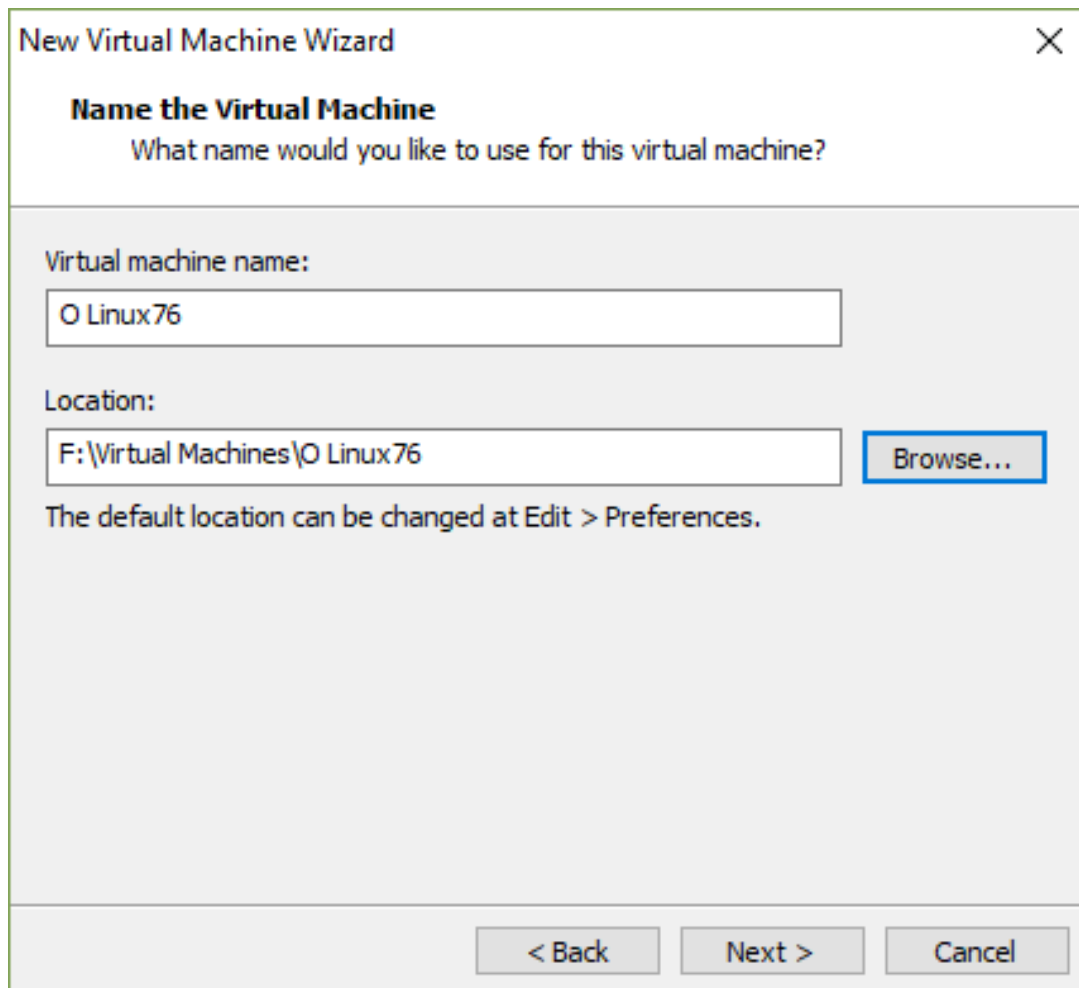


Fig.10.6. VMware. Location of the installation.

The maximum disk size is set and it is possible to choose whether to partition the virtual disk, it is chosen to save it as a single file (fig. 10.7.). Forward.

In the next window, the hardware settings are adjusted to meet the requirements for installing Oracle Database 11g R2, Customize Hardware is selected (fig. 10.8.).

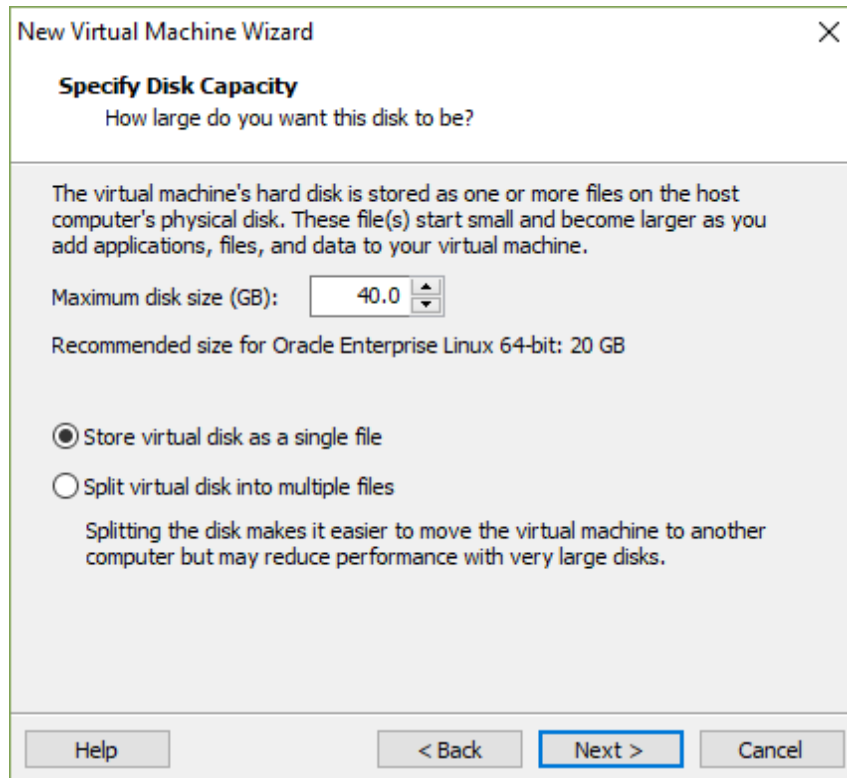


Fig.10.7. VMware. Select installation in one file.

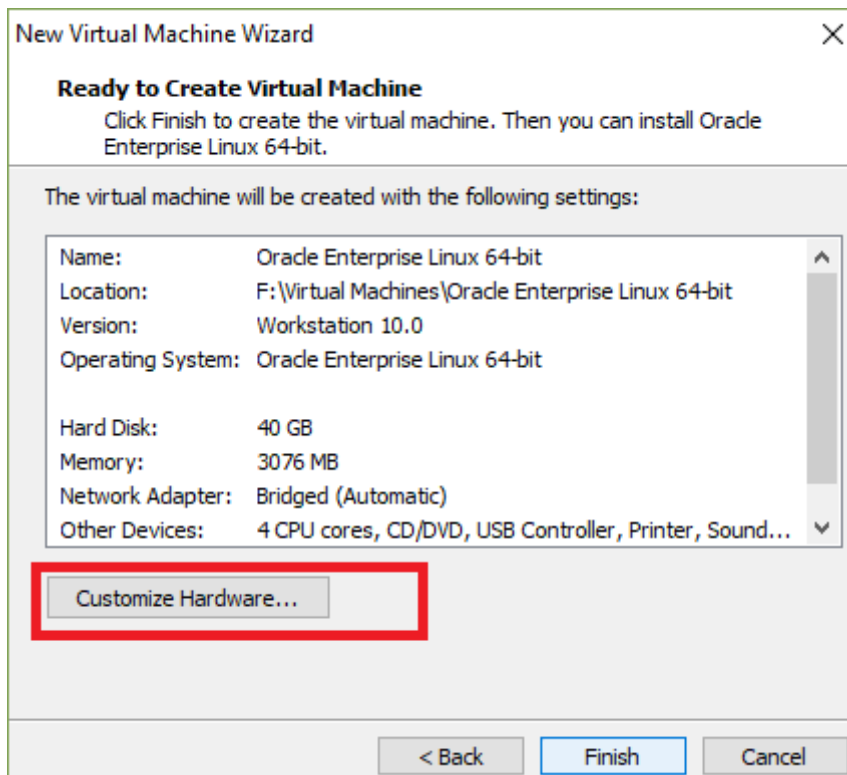


Fig.10.8. VMware. Choice to change the parameters of the virtual machine.

The following are the hardware settings. According to the standard requirements, the required memory for this virtual machine is 2 GB or 2048 MB, 2 processor cores with 2 threads each. It is good that the RAM is at least 3 GB - 3076 MB, 2 processor cores with 2 threads (fig. 10.9. And Fig. 10.10.).

For this version of Linux to work seamlessly with Oracle databases from the practical experience of administrators, the minimum amount of RAM must be at least 2.5 GB or 2560 MB.

The system that will be configured in this course has 2560 MB RAM (or more).

Hardware that will not be used should be removed from the virtual machine architecture.

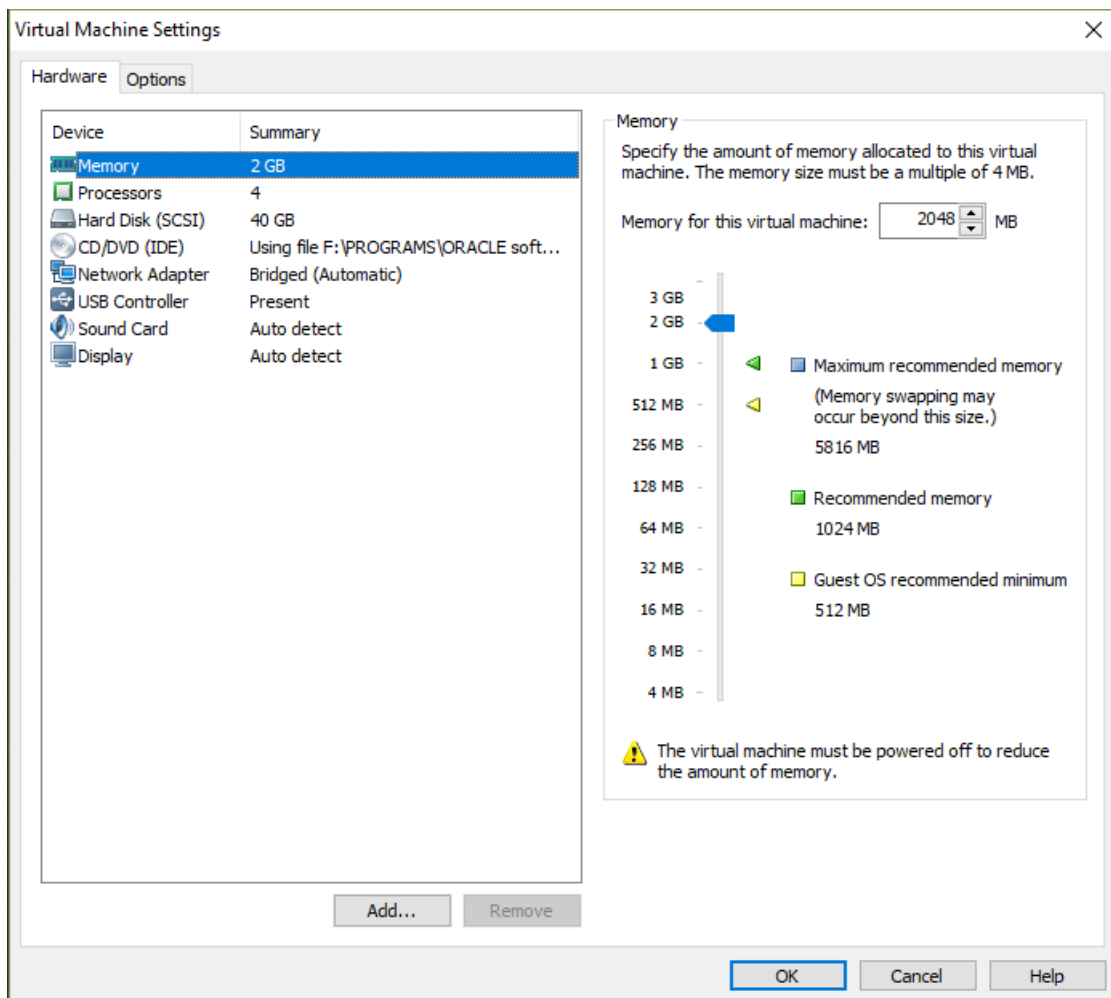


Fig.10.9. VMware. Configuring the hardware of the virtual machine - RAM.

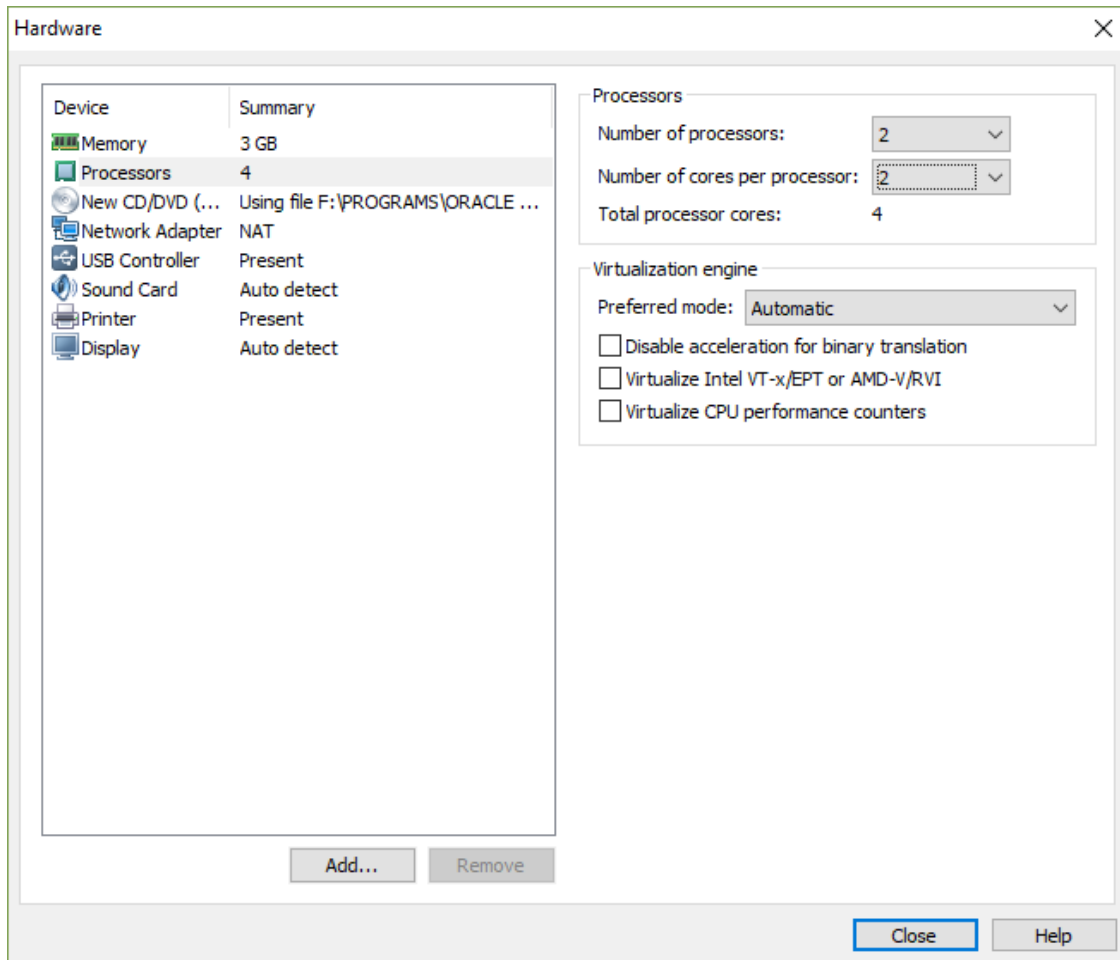


Fig.10.10. VMware. Configuring the hardware of the virtual machine - processor.

When configuring the network adapter - "Network adapter", Bridged is selected for connection to the physical device of the computer (fig. 10.11.).

Some devices may not be needed for future use of the system, they are removed from the configuration.

After configuring the hardware, return to the waiting window and select Finish, with which the virtual machine is created (fig. 10.12.).

Even after creating with the Edit virtual machine settings option, it is possible to edit the hardware parameters of the system, this should be done very carefully.

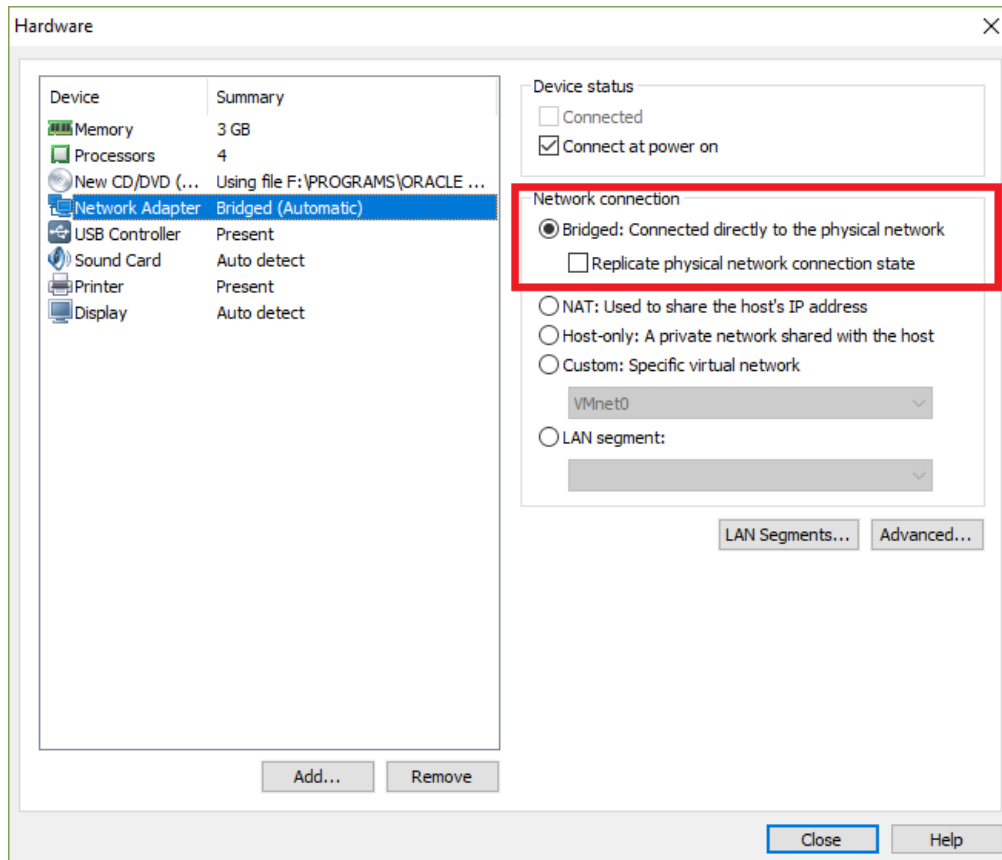


Fig.10.11. VMware. Configuring the network adapter.

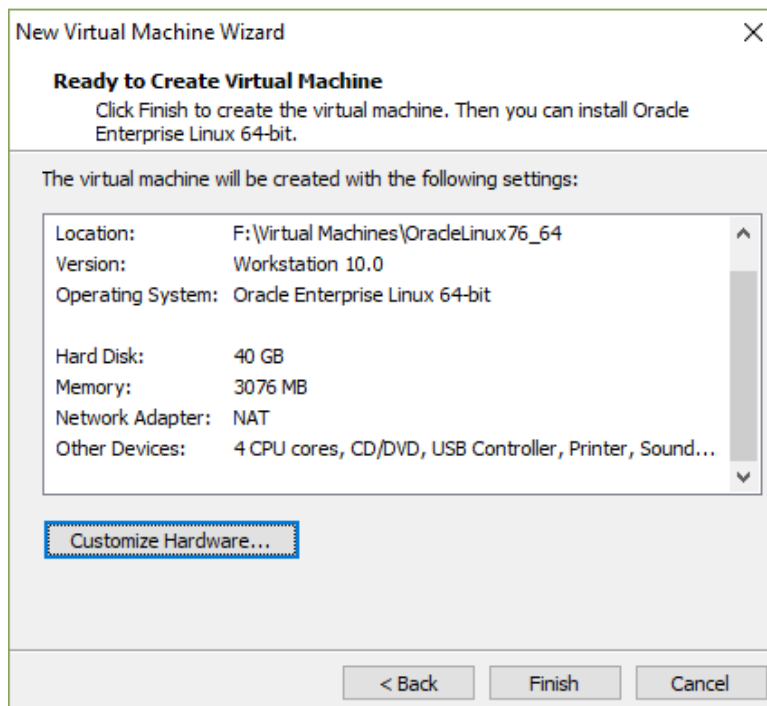


Fig.10.12. VMware. Review and finalization.

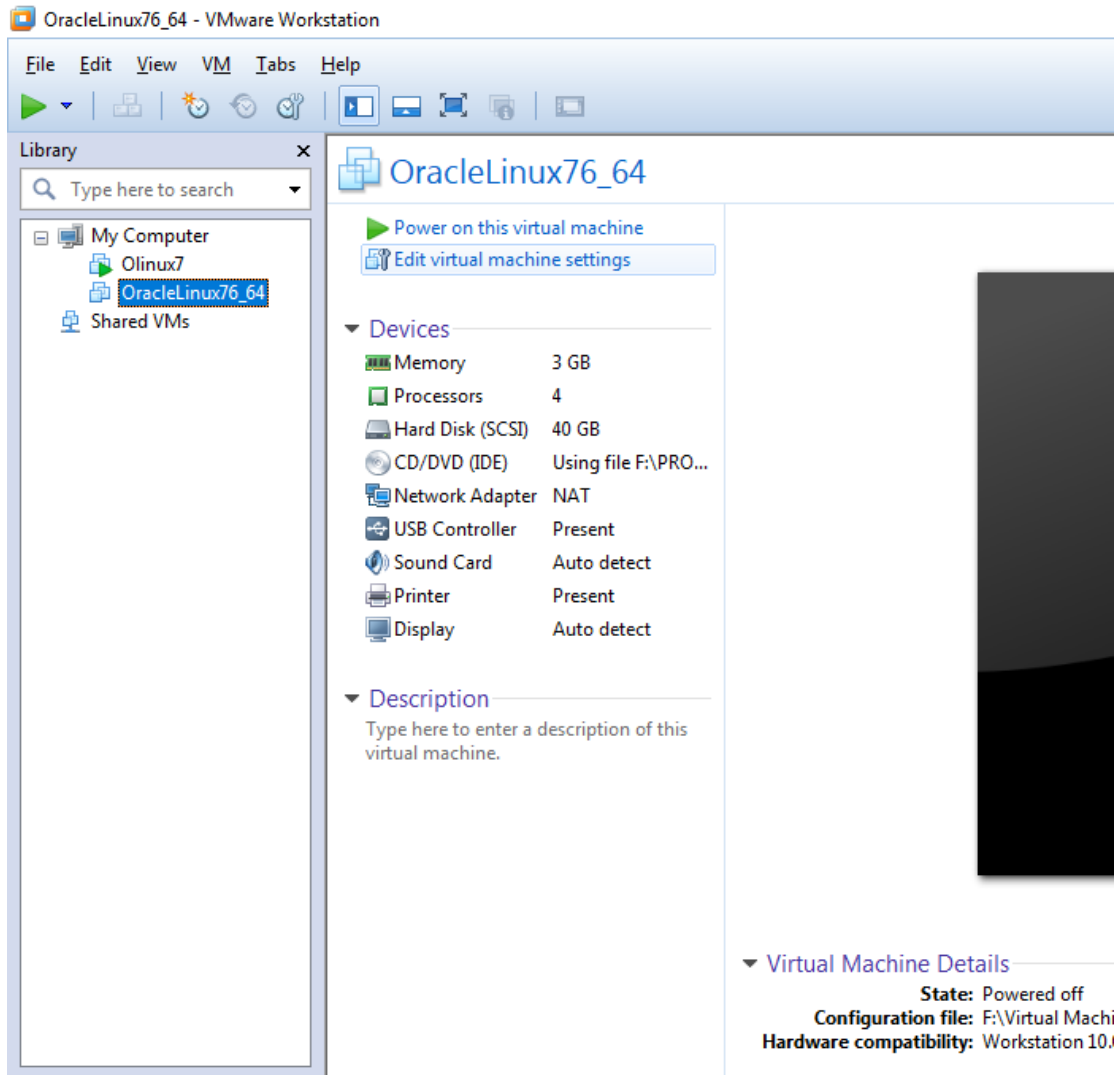


Fig.10.13. VMware. Start the virtual machine.

Next is the installation of Oracle Linux on the virtual machine thus created. For this purpose, the machine is started in the menu of VMware Workstation (fig. 10.13.). Start the virtual machine. Select Install Oracle Linux 7.6 and choose Enter (fig. 10.14.).

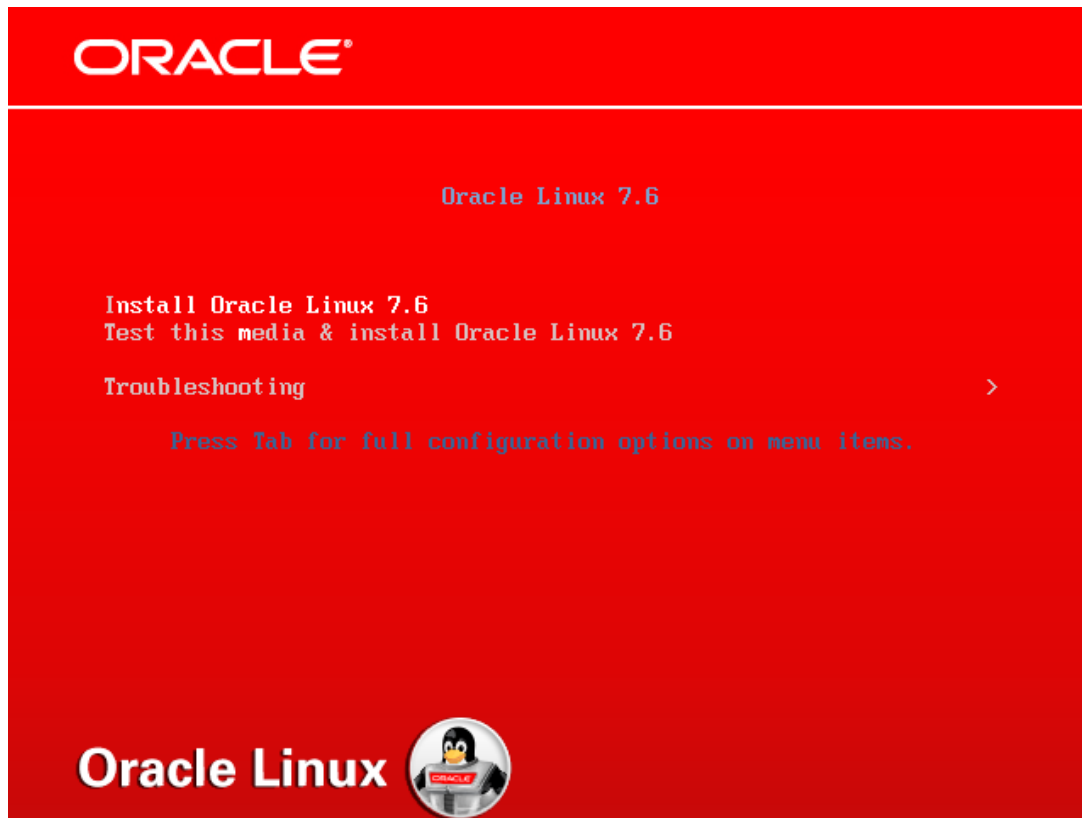


Fig.10.14. Launch Oracle Linux Installation.

Select the language for the installation, leave it in English and select continue (fig. 10.15).

When starting the installation program, several basic settings are configured, before that you may have to wait a while to recognize the configuration so far and load the menus in the installation program (fig. 10.16).



Fig.10.15. Installing Oracle Linux. Choice of language for the installation process.



Fig. 10.16. Installing Oracle Linux. Configuration recognition.

1. Date and time zone:



Fig. 10.17. Installing Oracle Linux. Select date and time zone.

The region of Europe, the city of Sofia, the keyboard layout are selected and the date and time are checked. Then select Done (fig. 10.17.).

2. Software Selection of the installation:

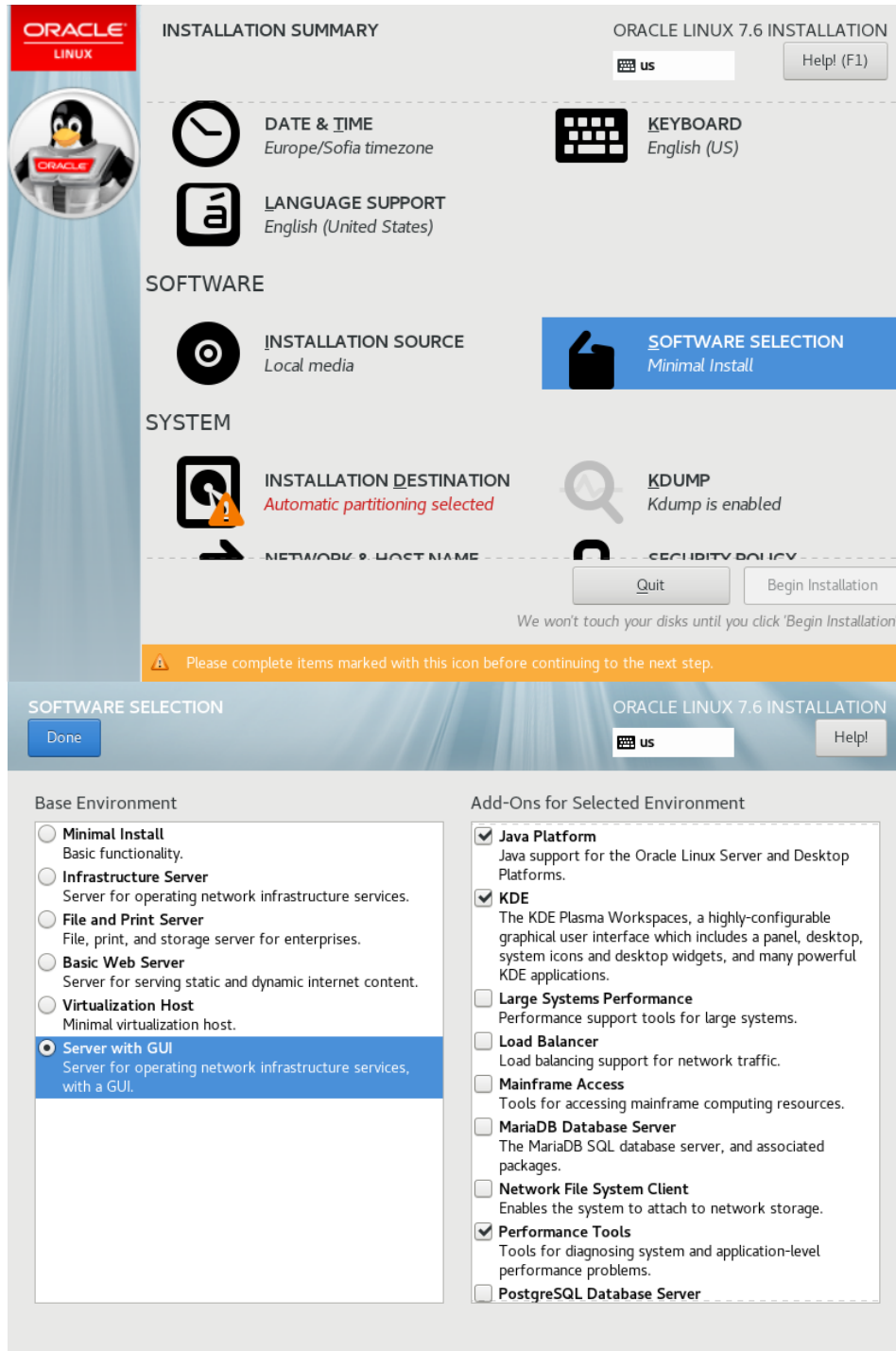


Fig. 10.18. Installing Oracle Linux. Choice of software packages.

Software selection. Select Server with GUI and select the following add-ons for the selected environment (fig. 10.18.):

- Development Tools;
 - Virtualization Tools;
 - System Administration Tools.
- Confirmed with Done.

3. Installation Destination.

Click on I will configure partitioning and then Done (fig. 10.19.).

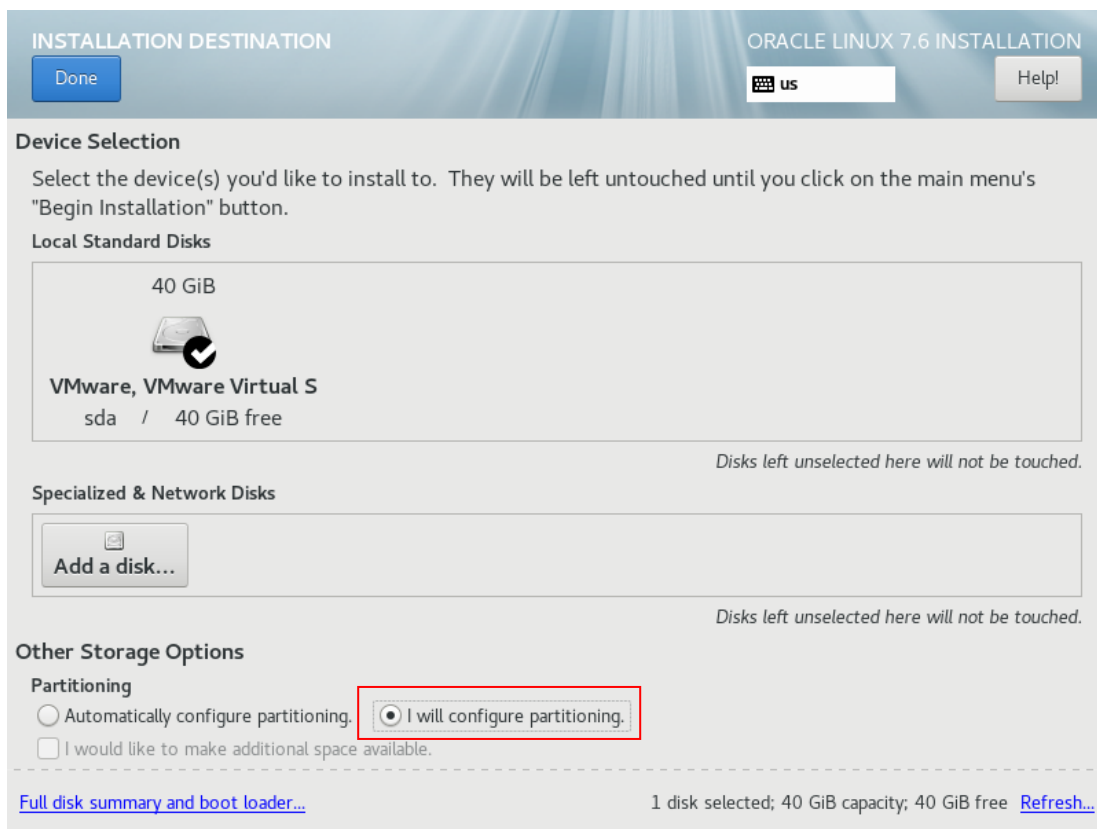


Fig. 10.19. Installing Oracle Linux. Installation Destination.

Select Standard Partition (fig. 1.20).

Select the "+" sign to create a new disk partition with a capacity of 35700 MB as / and mount this partition by selecting Add mount point (fig. 10.21.).

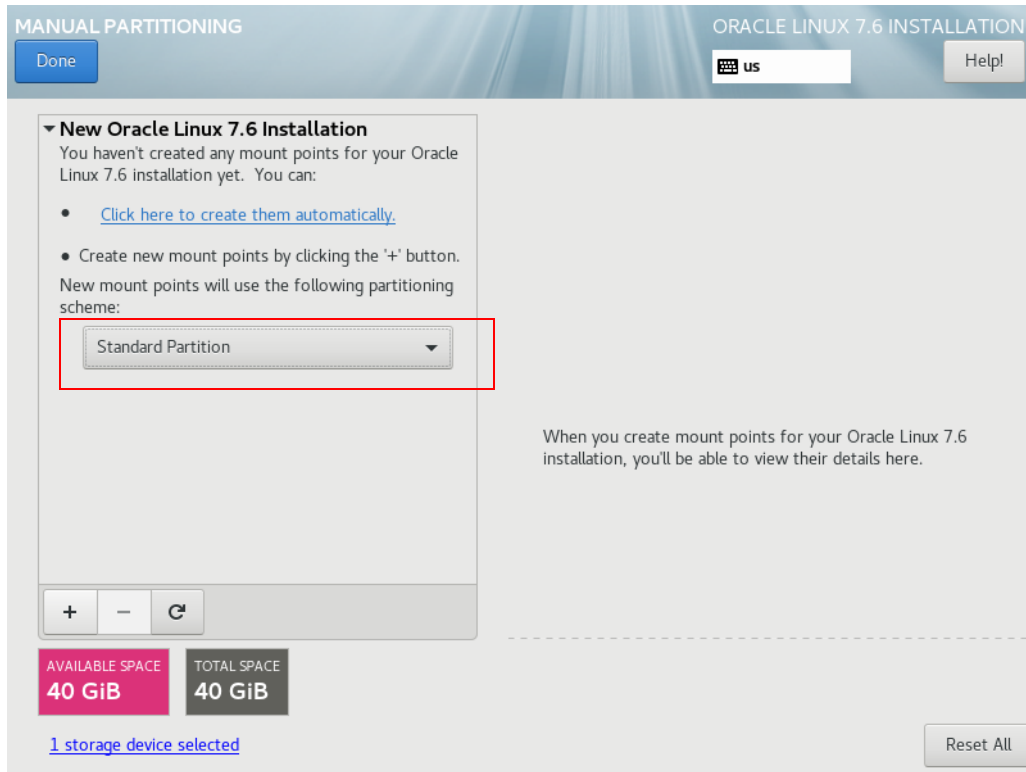


Fig. 10.20. Installing Oracle Linux. Destination - Standard Partition.

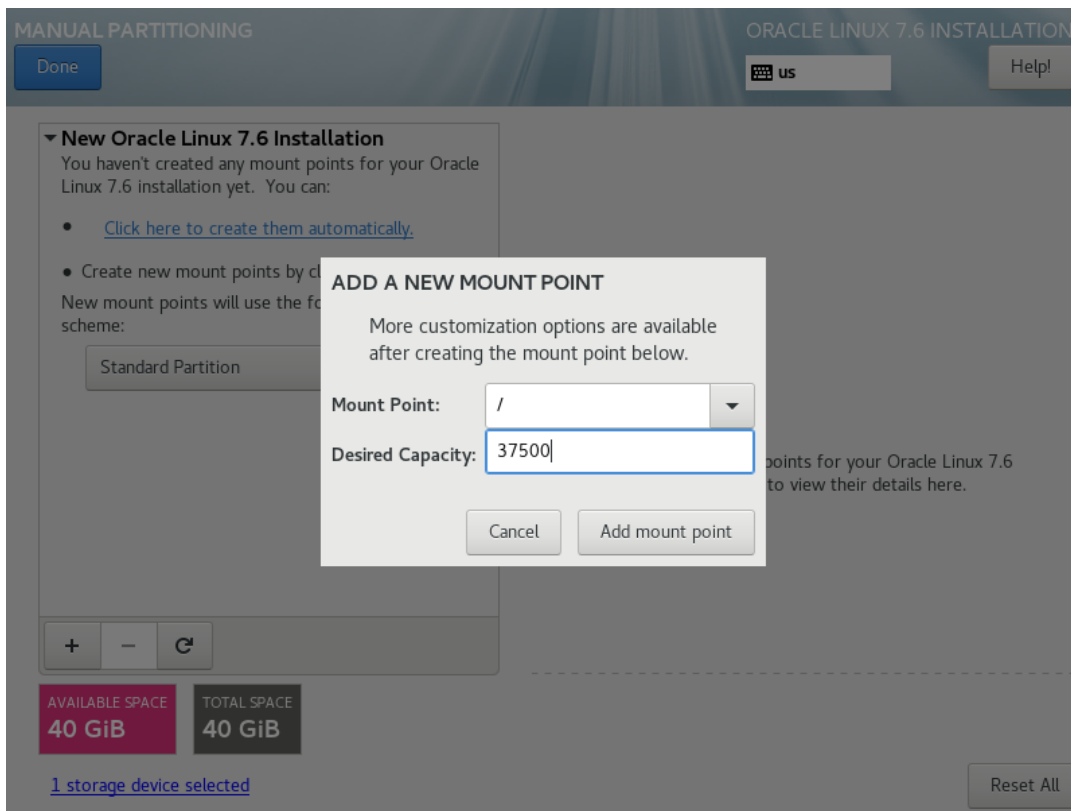


FIG. 10.21. Installing Oracle Linux. Create a new disk partition.

The file system type is selected to be **ext4** (fig. 10.22).

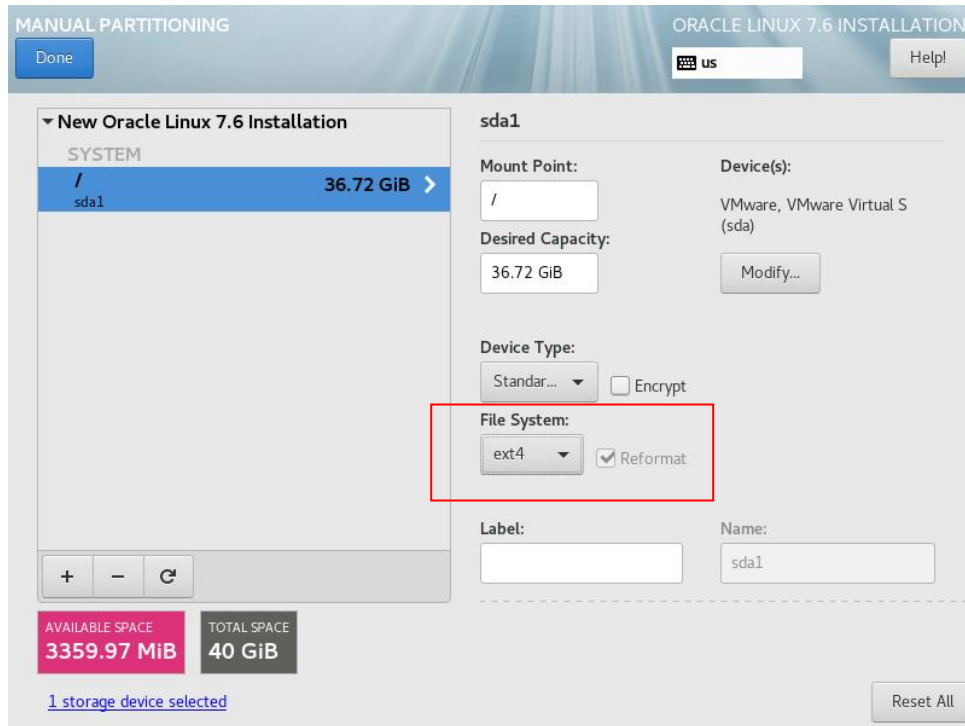


Fig. 10.22. Installing Oracle Linux. File system selection.

Add a Swap Mount point for the rest of the disk space and click on Done (fig. 10.23. and fig.10.24.).

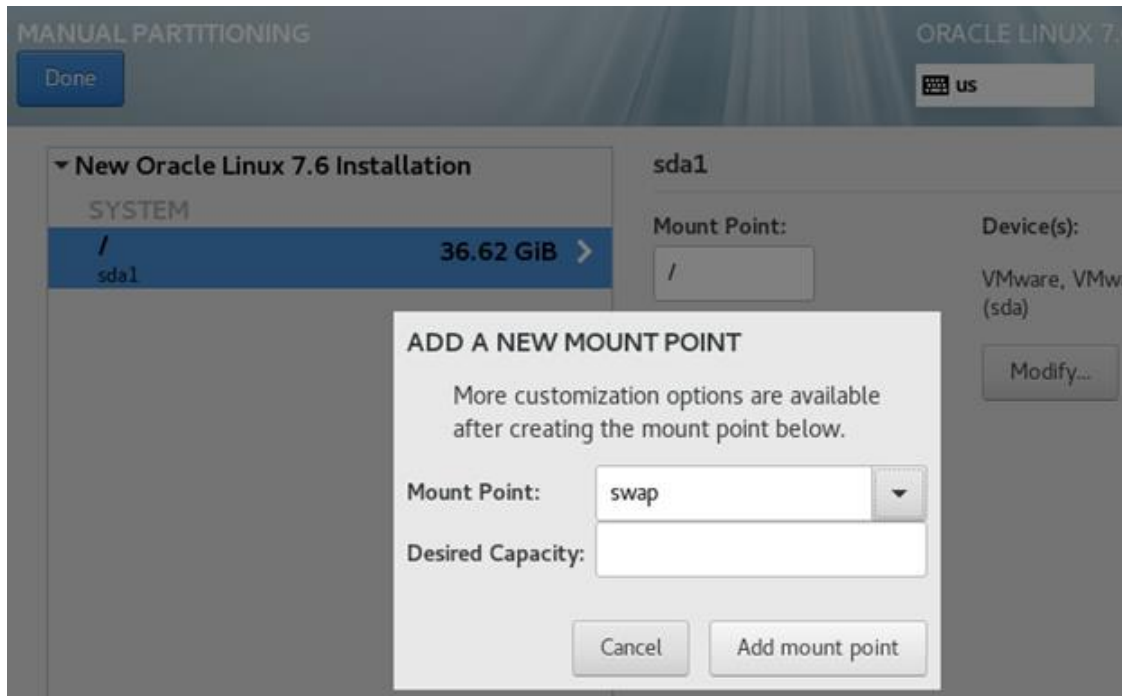


Fig. 10.23. Installing Oracle Linux. SWAP selection.

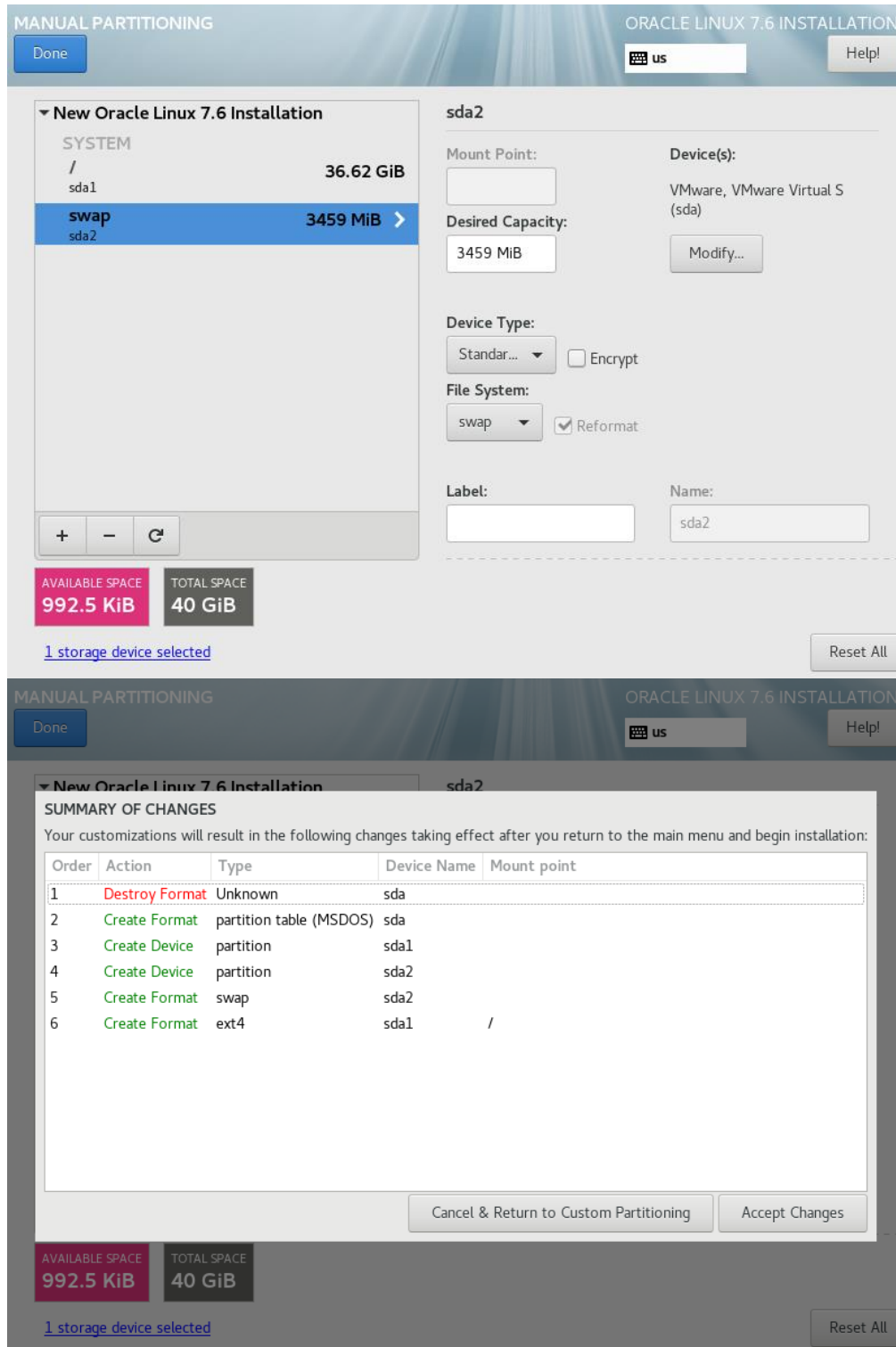


Fig. 10.24. Final state of disk space.

- Accept Changes is selected.
4. Network & Host Name

The network adapter turns on. The Host Name is set, by default the host name is **localhost.localdomain** (fig. 10.25.).

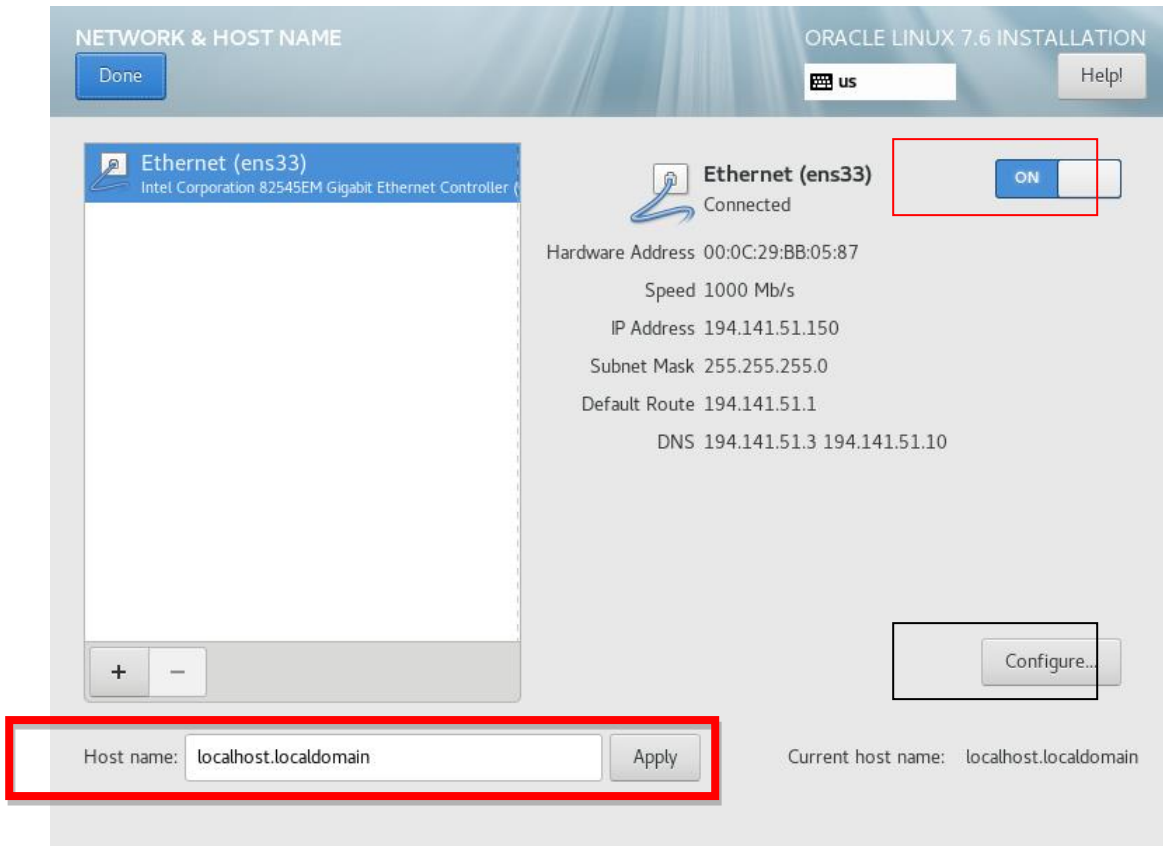


Fig. 10.25. Network adapter setup.

The network settings are configured by Configure..., then saved by selecting Save and ending these settings by selecting Done on the output window (fig. 10.26.).

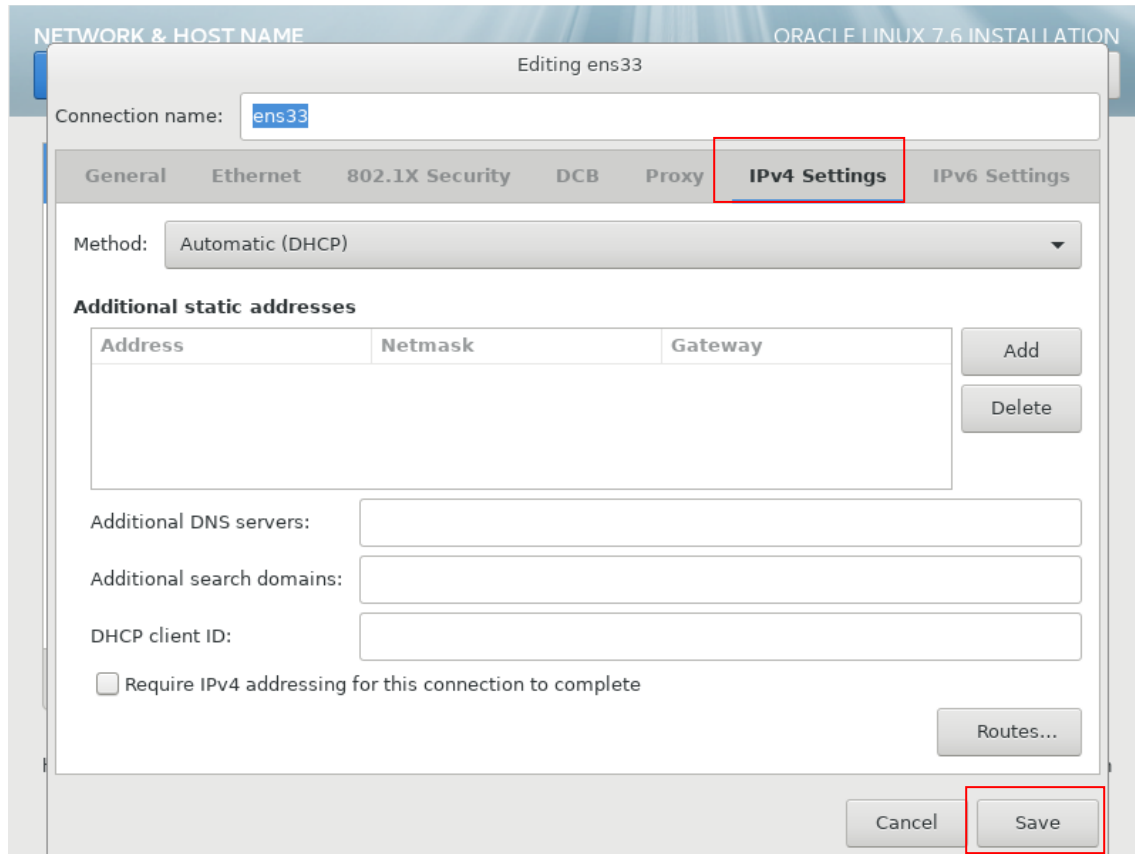


Fig. 10.26. Configure network settings.

Finish with the configurations and select **Begin Installation** from the main installation window (fig. 10.27.).

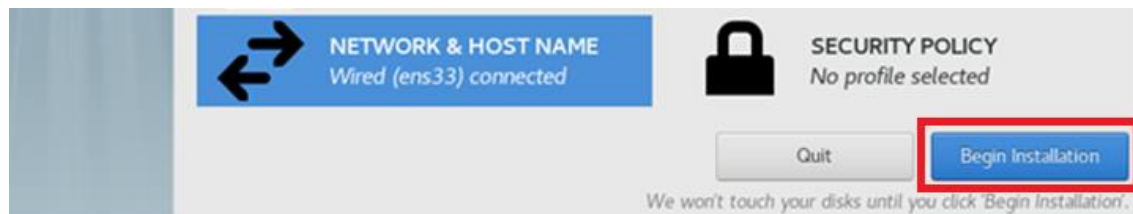


Fig. 10.27. Start the installation process.

5. Create a password for the super user root - Olinux76 (fig. 10.28.).

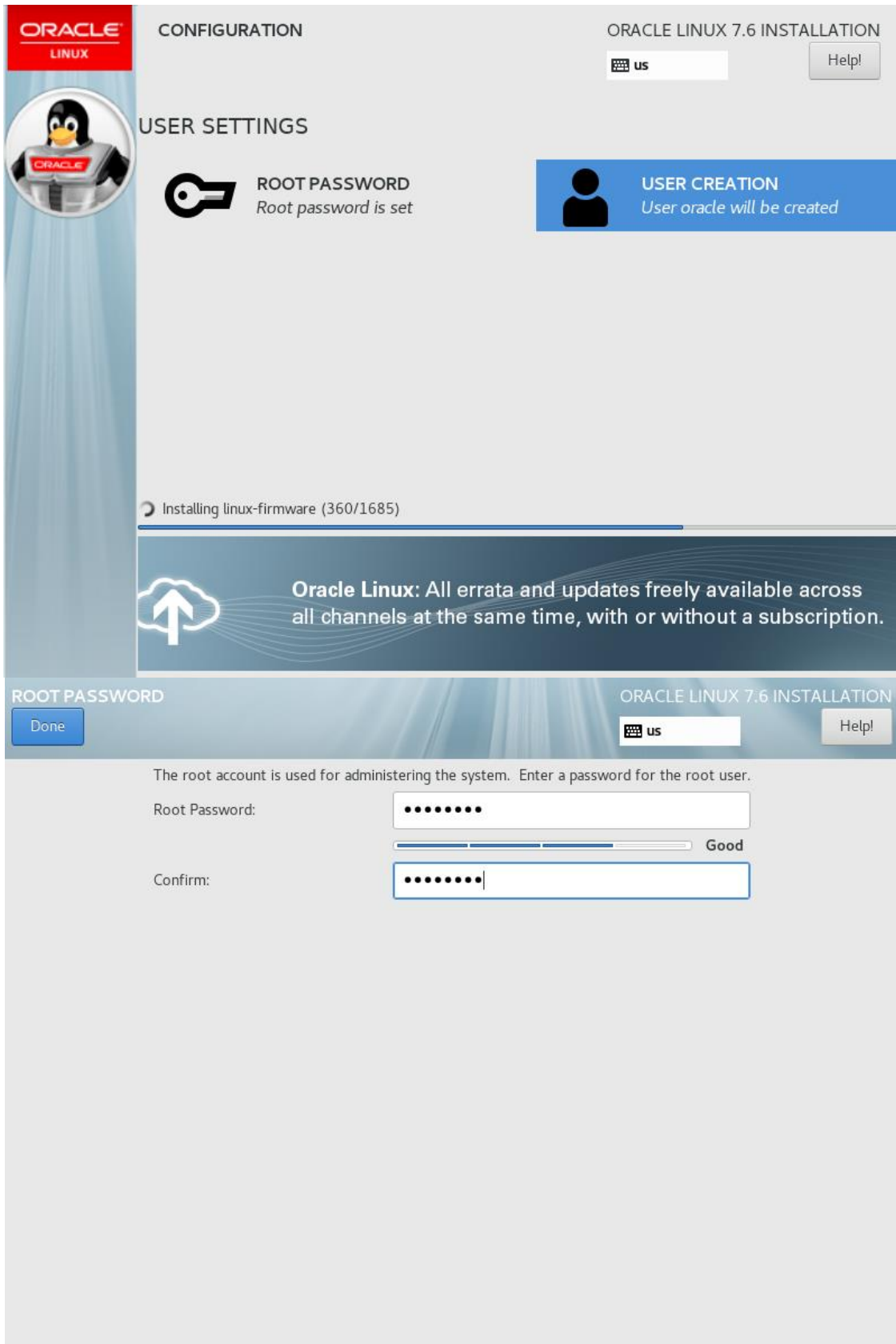


Fig. 10.28. Create a password for the super user root.

6. Create an oracle user from User Creation (fig. 10.29.).

CREATE USER

ORACLE LINUX 7.6 INSTALLATION

Done

us

Help!

Full name: oracle

User name: oracle

Tip: Keep your user name shorter than 32 characters and do not use spaces.

Make this user administrator

Require a password to use this account

Password: ●●●●●●

Good

Confirm password: ●●●●●●

Advanced...

Fig. 10.29. Create an oracle user.

From Advanced... can be changed if necessary its home directory. Leave the field as default (fig. 10.30).

ADVANCED USER CONFIGURATION

Home directory: /home/oracle

User and Group IDs

Specify a user ID manually: 1000 - +

Specify a group ID manually: 1000 - +

Group Membership

Add user to the following groups:

Example: wheel, my-team (1245), project-x (29935)

Tip: You may input a comma-separated list of group names and group IDs here. Groups that do not already exist will be created; specify their GID in parentheses.

Cancel Save Changes

Fig. 10.30. Defining an oracle user directory.

7. Select Reboot to complete the installation.
8. Follow the agreement with the license agreement and finish with the configuration (fig. 10.31. and fig. 10.32.).

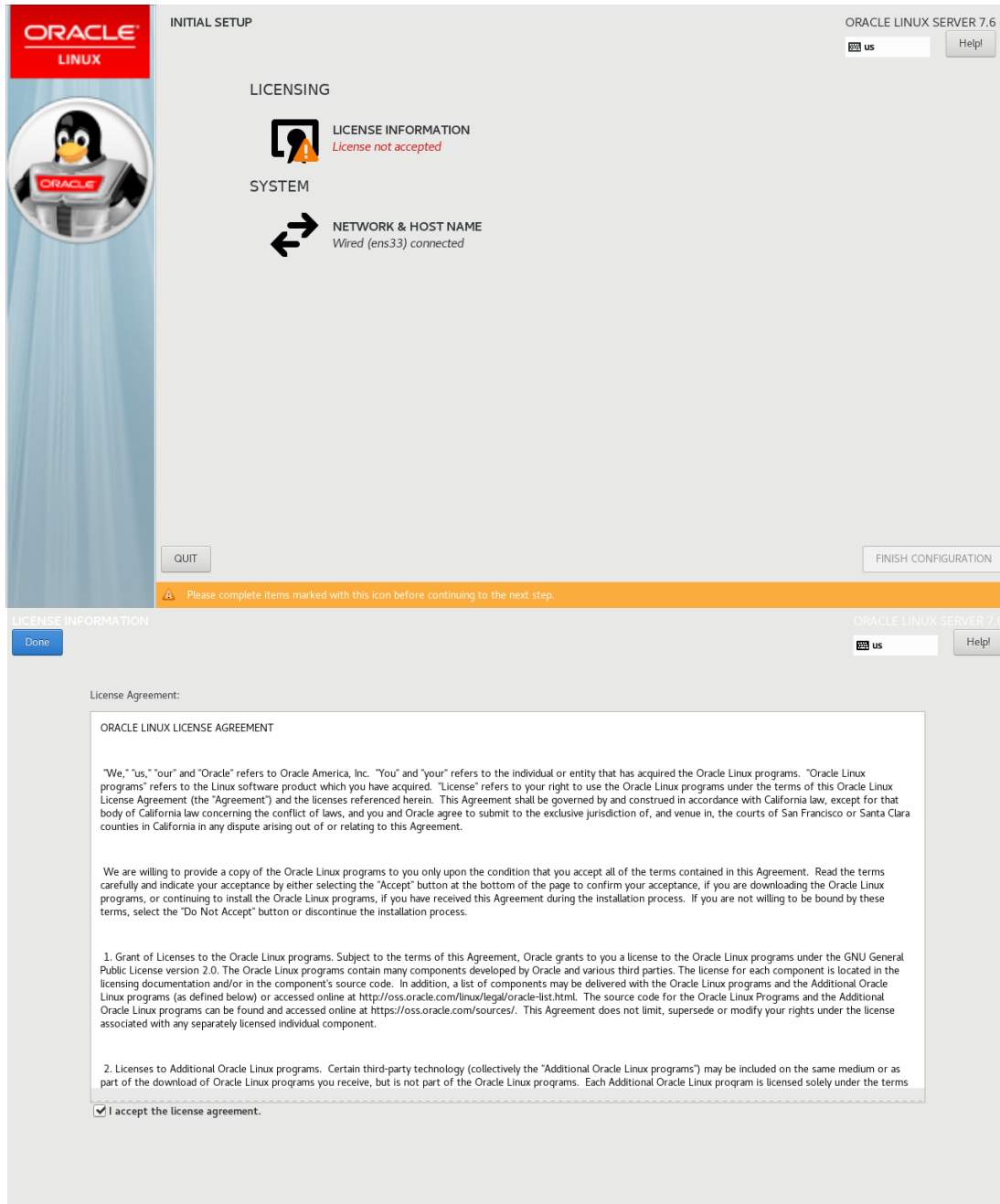


Fig. 10.31. Oracle Linux License Agreement.

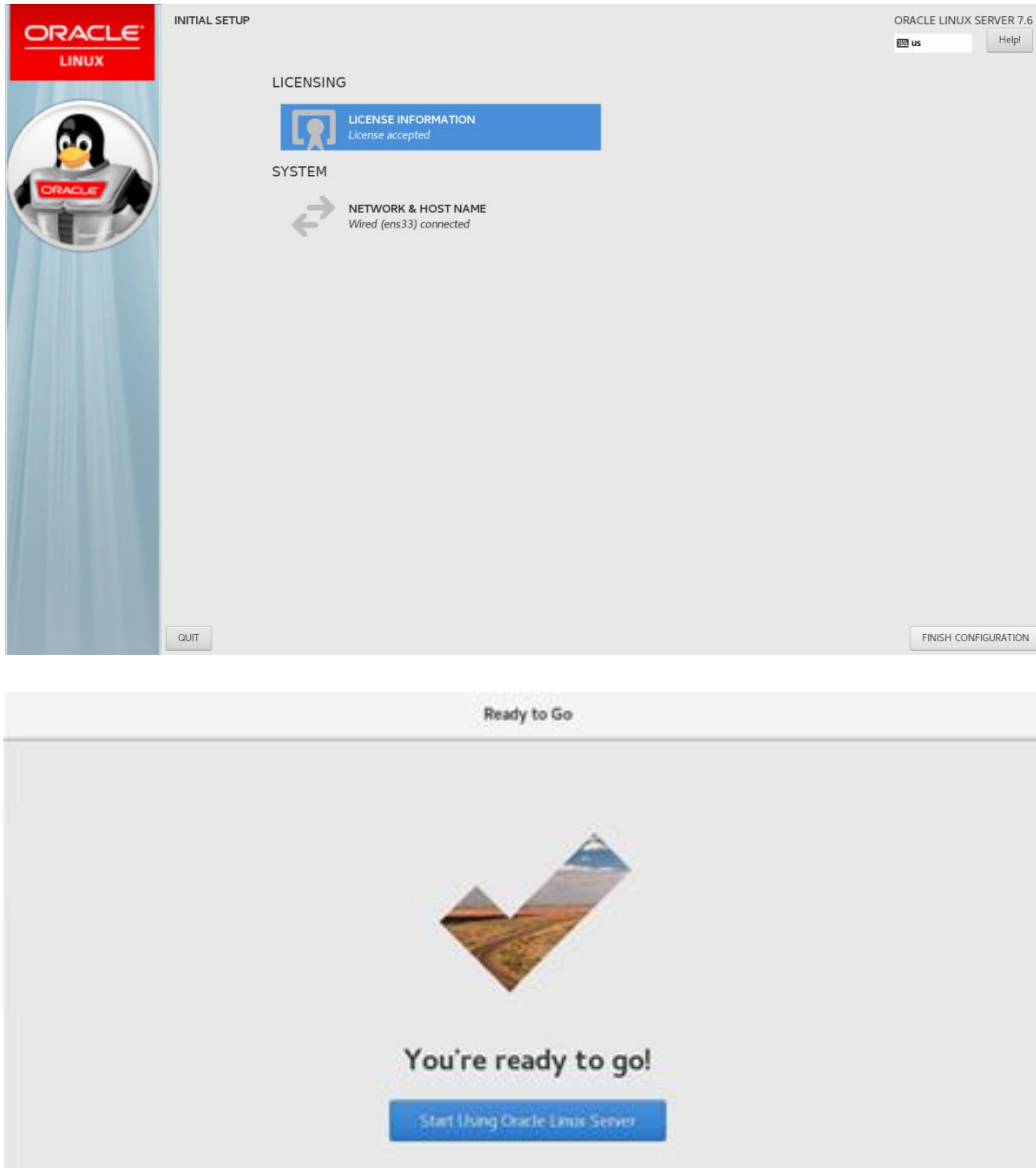


Fig. 10.32. End of Oracle Linux configuration.

When you first start the operating system, you log in with the name root and the pre-set administrator password. A message is displayed asking the user for language settings and others that are not changed, and the short operation manual is omitted until the ready message is displayed, which completes the installation and configuration (fig. 10.32).