

GK-2A Medium-scale Data Utilization for weather forecast data (MDUS)

S/W Install Manual

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1. OUTLINE

This document is the install manual of the GK-2A MDUS S/W.

1.1 Purpose

To describe the procedure to install and set up the GK-2A MDUS S/W.

1.2 Definition of key terms

MDUS	Medium-scale the meteorological data receiving system
Server	Hardware server or server software
GNURadio	
Pulse shaping	Pulse shaping
Coding	Coding

1.3 Abbreviation

MDUS	Medium-scale Data Utilization Station
SDR	Software Defined Radio
GK2A	GeoKompsat-2A
HRIT	High Resolution Information Transmission

2. CONFIGURATION H/W

[Table 2-1] is the H/W specification for operating GK2A HRIT reception s/w.

[Table 2-1] H/W Specification

Item	Minimum	Recommend
OS	CentOS 7 [64bit]	
CPU	4Core, 2.4GHz 이상	
RAM	8GB	16GB 이상
Disk	100GB	1TB 이상
Network	100Mbps	1Gbps

2.1 MDUS SDR Dongle Requirement

User can setup MDUS using a SDR dongle instead of a regular hardware receiver. The SDR dongle inputs the IF signal of the antenna. Next, it outputs a digital signal to the User PC in the form of USB or PCI type.



[Figure 2-1] Configuration SDR H/W

When SDR dongle is used for MDUS setup, the following equipment should be used.

[Table 2-1] Attribute of SDR Dongle

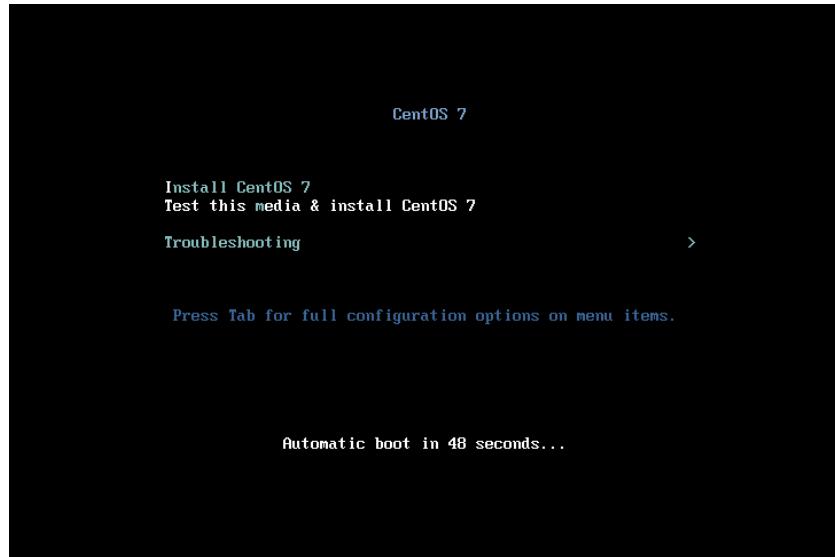
Item	Requirement
SDR Dongle Specification	Input Frequency : Support output frequency of user LNB Processing speed : Support over 10Msps Processing S/W : Support GNURadio
GNURadio Library version	Compliance with SDR dongle requirements
SDR Configuration Channel Coding	Reed-Solomon (255/223, 4) and Convolution coding (1/2, K=7)
SDR Configuration Pulse shaping	Root-Raised Cosine with 0.5 of roll-off factor
SDR Configuration Modulation	NRZ-L/QPSK

3. INSTALL RECEIVER S/W

3.1 Install OS

3.1.1 Install CentOS 7

Install CentOS 7 to run GK-2A receiving S/W. The installation procedure is as follows:



[Figure 3-1] Start of CentOS 7 installation

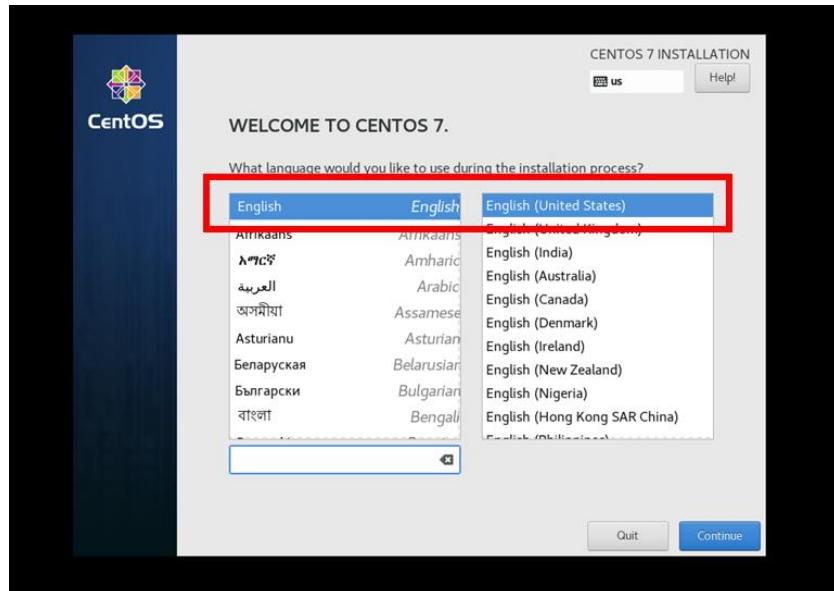
```
- Press the <ENTER> key to begin the installation process.
[  7.472473] dracut-pre-udev[320]: modprobe: ERROR: could not insert 'floppy':
[   OK ] No such device
[   OK ] Started Show Plymouth Boot Screen.
[   OK ] Reached target Paths.
[   OK ] Started Forward Password Requests to Plymouth Directory Watch.
[   OK ] Reached target Basic System.
[   OK ] Started Device-Mapper Multipath Device Controller.
          Starting Open-iSCSI...
          Mounting Configuration File System...
[   OK ] Mounted Configuration File System.
[   OK ] Started Open-iSCSI.
          Starting dracut-initqueue hook...
[  11.895575] sd 0:0:0:0: [sda] Assuming drive cache: write through
[  12.206581] dracut-initqueue[1063]: mount: /dev/sr0 is write-protected, mounting read-only
[   OK ] Started Show Plymouth Boot Screen.
[   OK ] Reached target Paths.
[   OK ] Started Forward Password Requests to Plymouth Directory Watch.
[   OK ] Reached target Basic System.
[   OK ] Started Device-Mapper Multipath Device Controller.
          Starting Open-iSCSI...
          Mounting Configuration File System...
[   OK ] Mounted Configuration File System.
[   OK ] Started Open-iSCSI.
          Starting dracut-initqueue hook...
[  12.206581] dracut-initqueue[1063]: mount: /dev/sr0 is write-protected, mounting read-only
[   OK ] Created slice system-checkisod5.slice.
          Starting Media check on /dev/sr0...
/dev/sr0: 1d2e8463d1bcae8ad491f4e5a07eb79f
Fragment sums: 3b55db1b9eccca7a20be82b85b49542dcc5ee4bb41bce8ff2fd4d675af7e
Fragment count: 20
Press [Esc] to abort check.
Checking: 058.7%_
```

5

[Figure 3-2] CentOS 7 Process Check

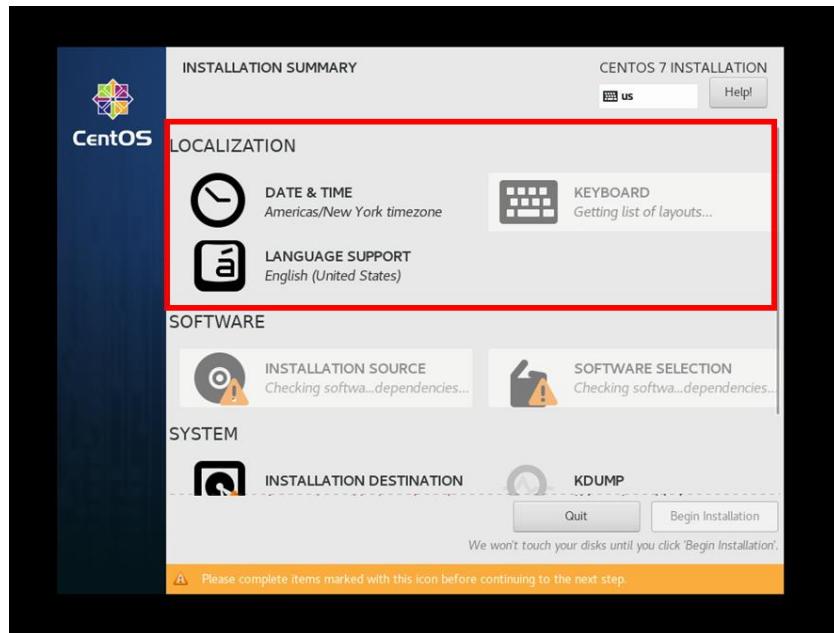
3.1.2 CentOS 7 Setup

User needs to set the language of CentOS 7 to English.



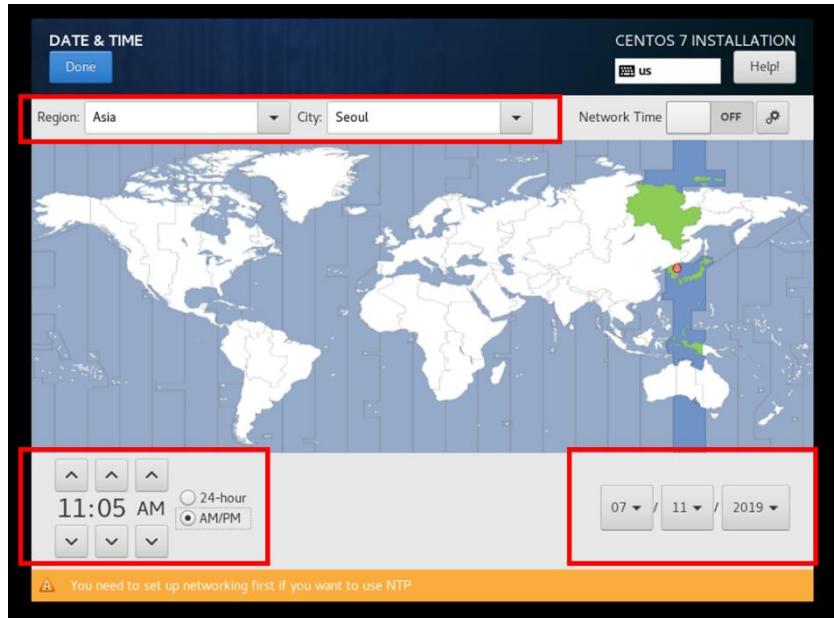
[Figure 3-3] CentOS 7 Language setup window

Next, set DATE & TIME, KEYBOARD, LANGUAGE & SUPPORT with CentOS 7 enabled.

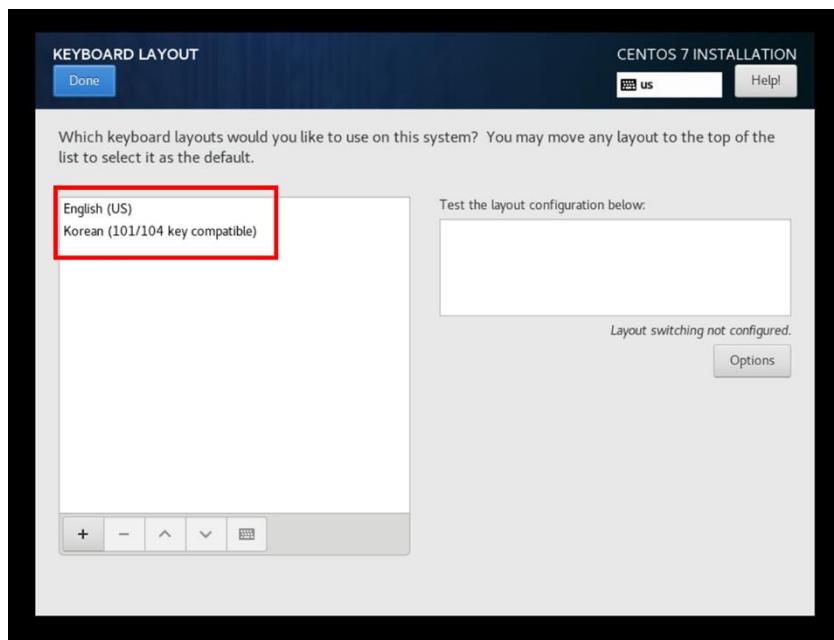


[Figure 3-4] CentOS 7 LOCALIZATION Setup window

Click DATE & TIME and set it to the value of the area as shown in [Figure 2-5]. Click KEYBOARD LAYOUT to add Korean (101/104 key compatible) as shown in [Figure 2-6]. (Region: Asia, City: Seoul, AM/PM)



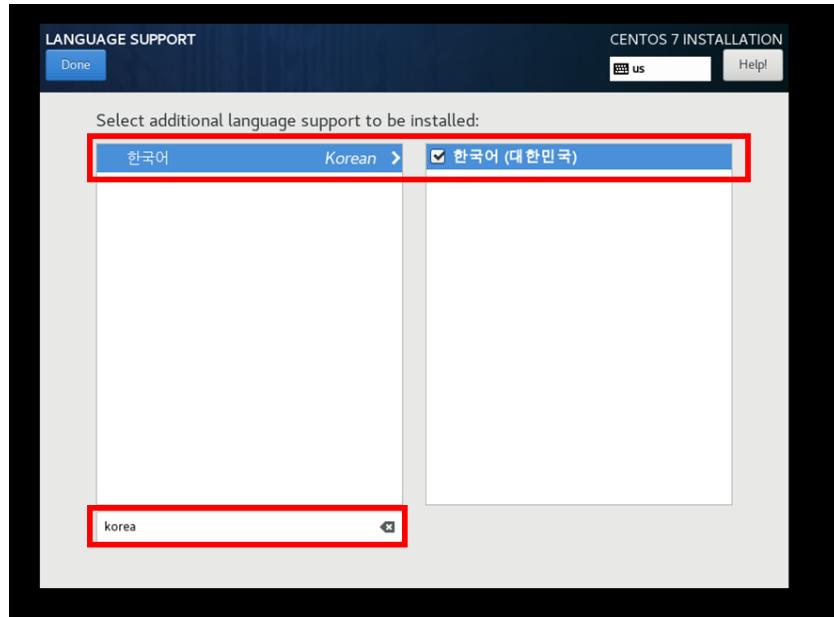
[Figure 3-5] CentOS 7 DATE & TIME Setup window



[Figure 3-6] CentOS 7 KEYBOARD LAYOUT Setup window

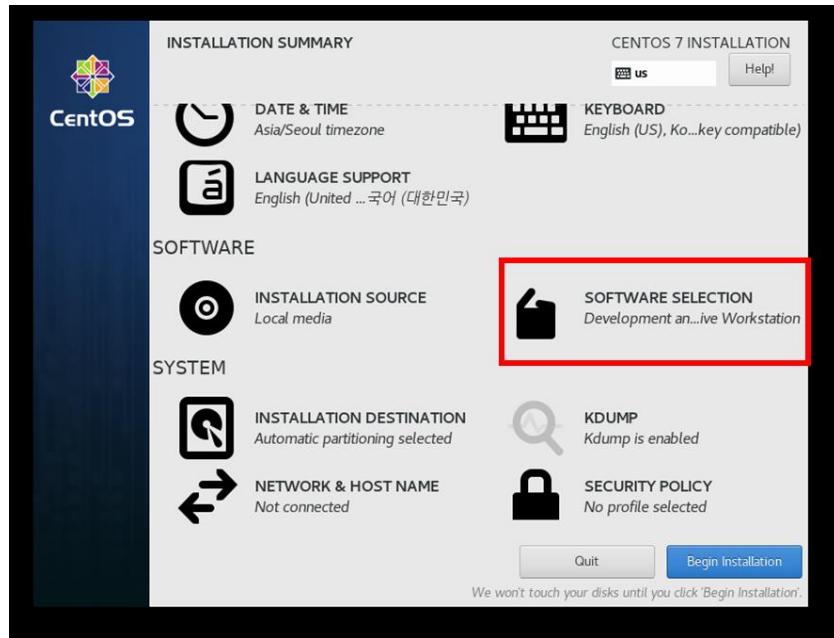
User can set additional language by clicking the LANGUAGE SUPPORT. [Figure 2-7] shows

example of setting Korean language.



[Figure 3-7] CentOS 7 LANGUAGE SUPPORT Setup window

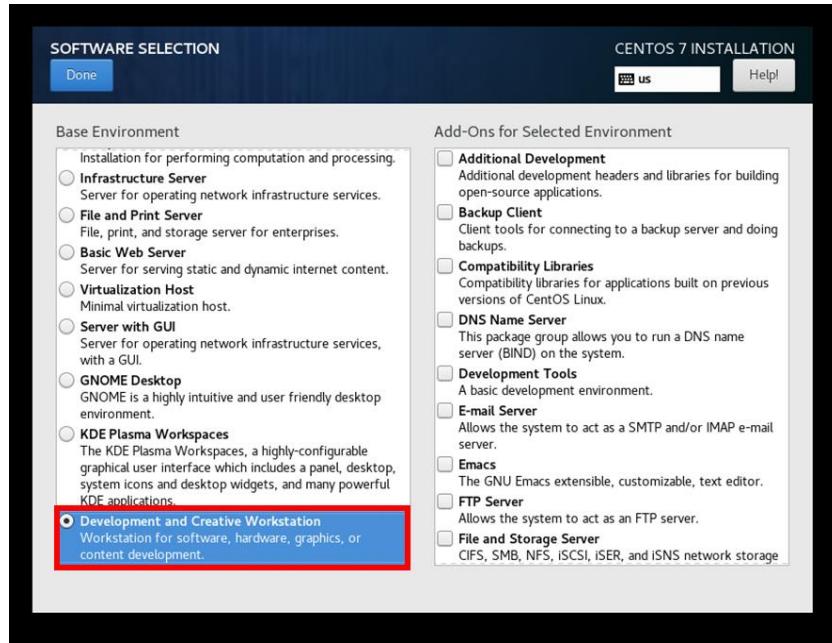
Next, set SOFTWARE with CentOS 7 enabled.



[Figure 3-8] CentOS 7 SOFTWARE Setup window

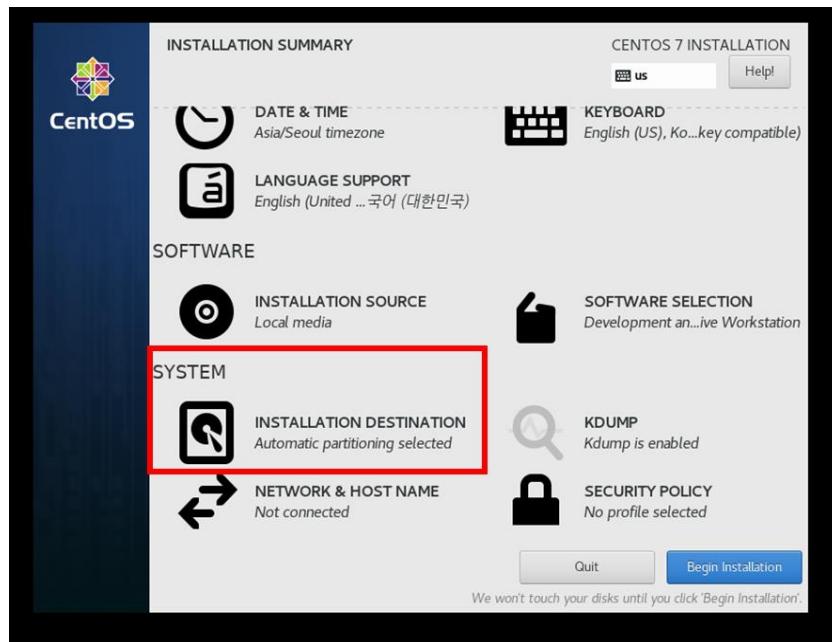
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Click SOFTWARE SELECTION and select "Development and Creative Workstation" in the Base Environment as shown in [Figure 2-9].



[Figure 3-9] CentOS 7 SOFTWARE SELECTION Setup window

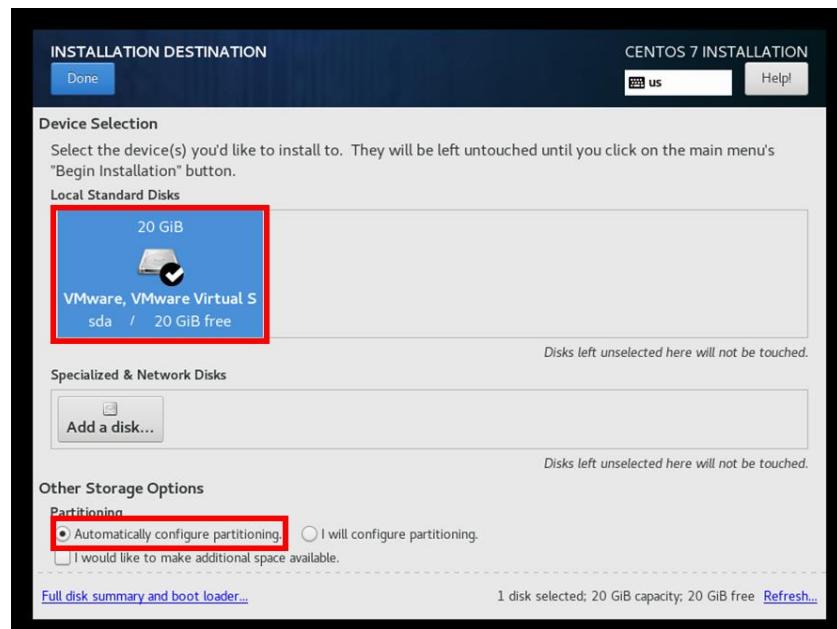
Next, set the SYSTEM with CentOS 7 enabled.



[Figure 3-10] CentOS 7 SYSTEM Setup window

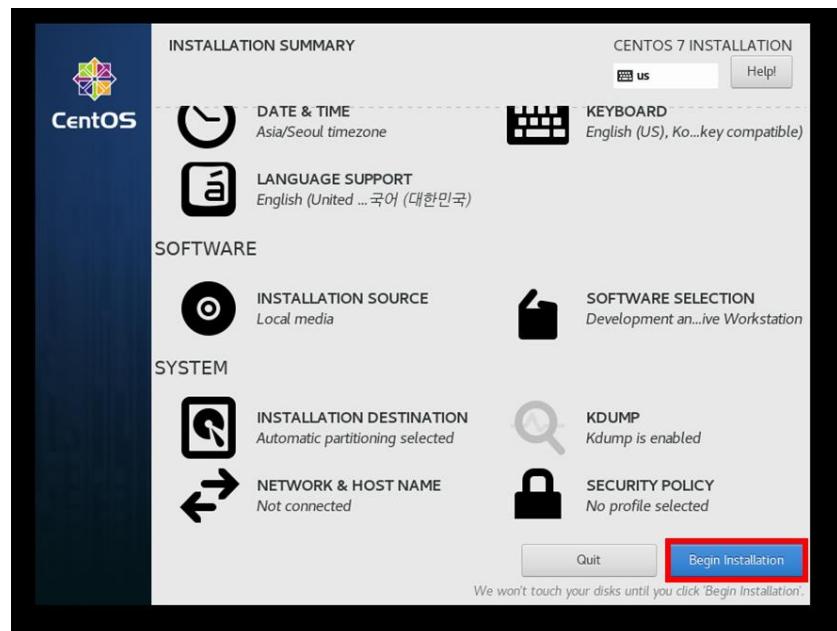
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Click INSTALLATION DESTINATION. Next, set Disk to install OS and Partitioning as shown in [Figure 2-11].



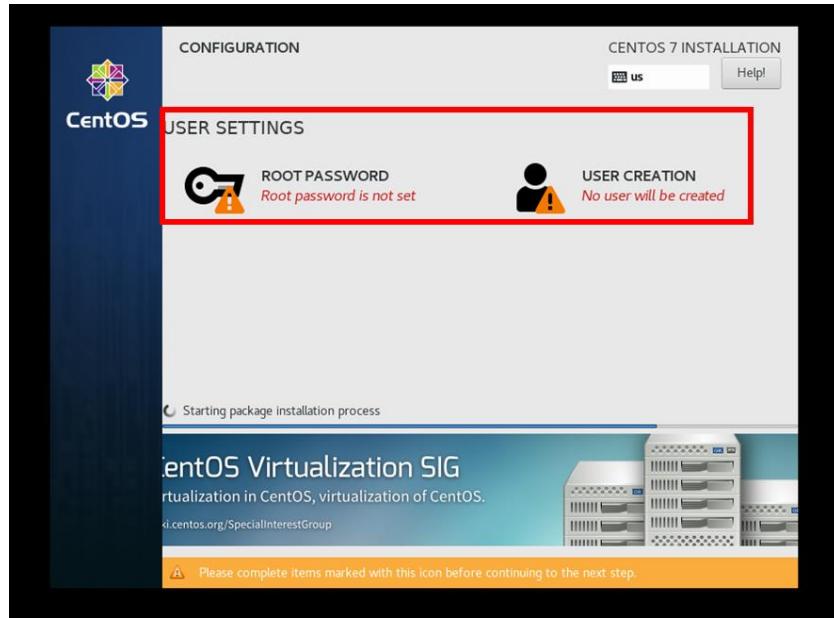
[Figure 3-11] CentOS 7 INSTALLATION DESTINATION Setup window

When all the settings are finished, the "Begin Installation" button is activated. Click on the activated button to start installing CentOS 7.



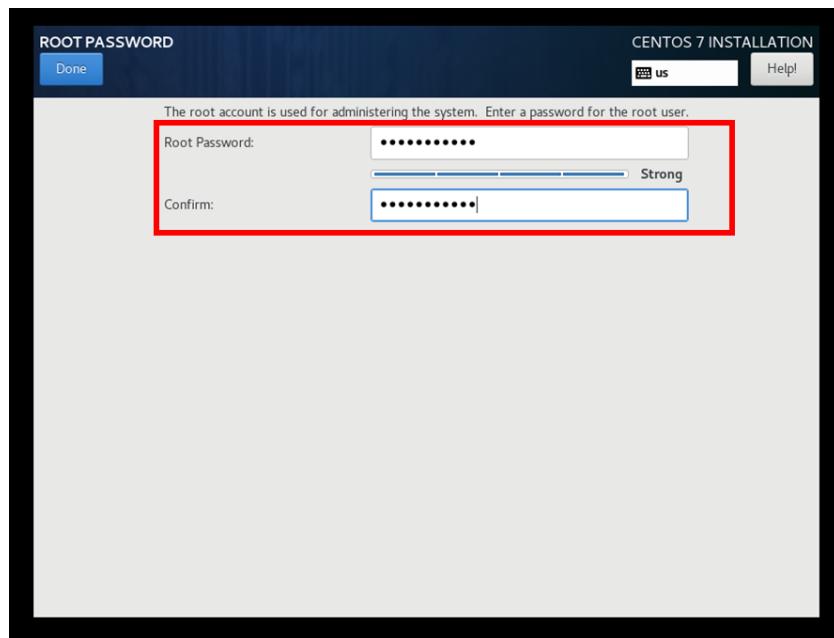
[Figure 3-12] CentOS 7 Setup window

The following is the user information setting step of the CentOS 7. It generates the root account password and creates a new user account.



[Figure 3-13] CentOS 7 USER SETTINGS window

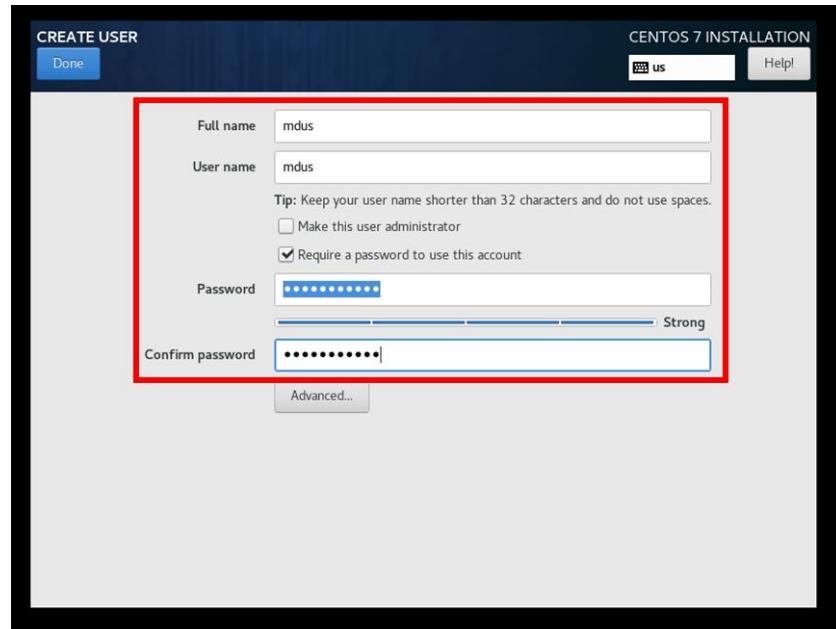
First, click the ROOT PASSWORD and set the root password as shown in [Figure 2-14].



[Figure 3-14] ROOT PASSWORD Setup window

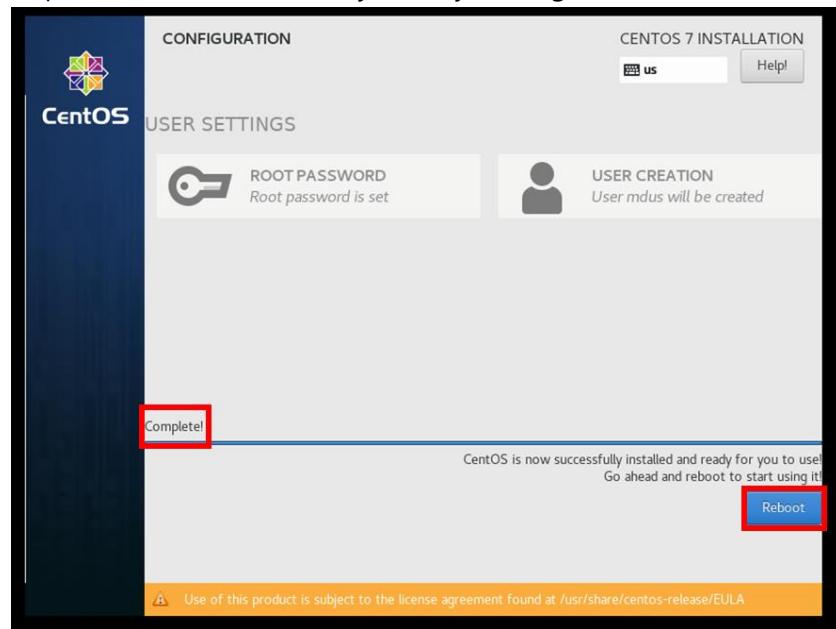
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Next, click USER CREATION to create user account and password as shown in [Figure 2-15].



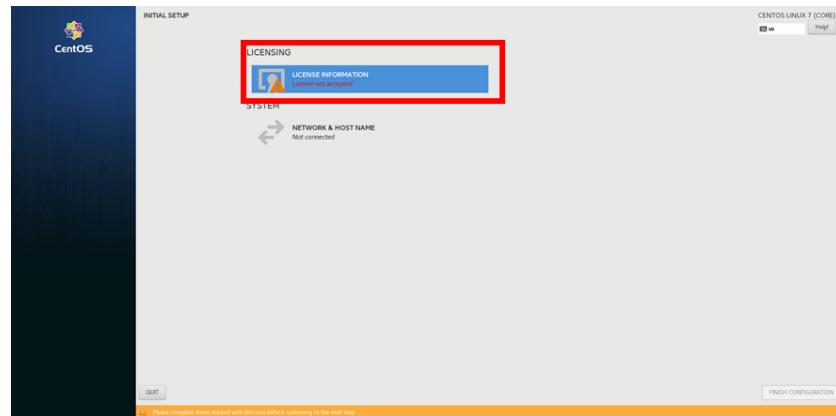
[Figure 3-15] USER CREATION window

After user creation is completed, "Complete!" Will be displayed at the bottom left when the installation is completed. Next, reboot the system by clicking on the activated "Reboot" button.



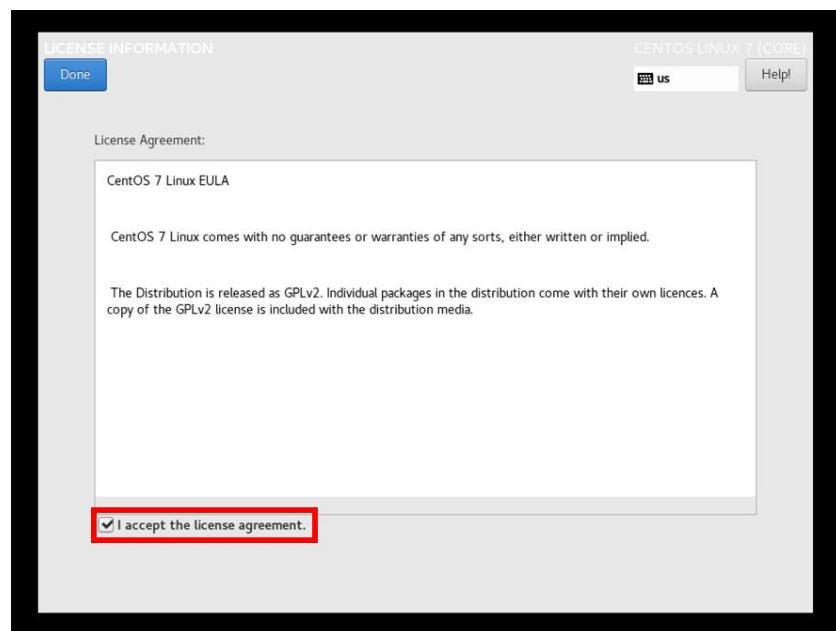
[Figure 3-16] CentOS 7 Install complete

When the reboot is completed, initialize it in INITIAL SETUP of [Figure 3-17].



[Figure 3-17] CentOS 7 Initial setup window

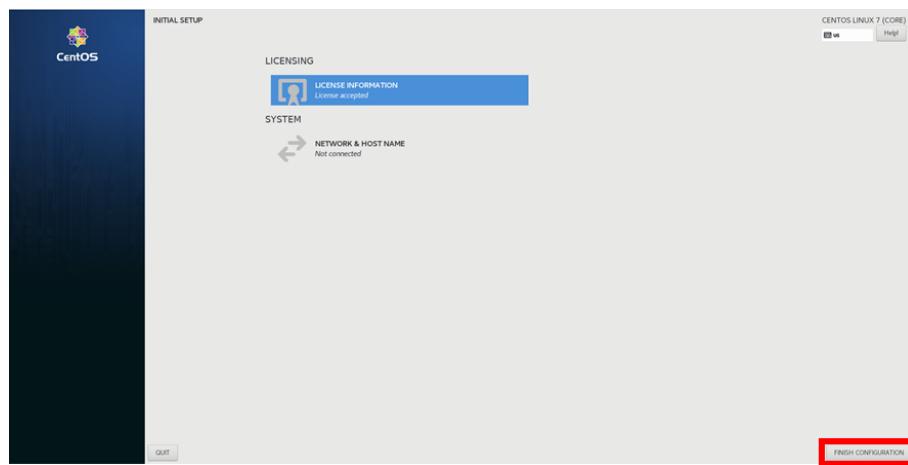
Click LICENSING to agree to LICENSE.



[Figure 3-18] CentOS 7 License agree window

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After completing the LICENSING initial setup, click the "FINISH CONFIGURATION" button on the bottom right to complete the installation of CentOS 7.



[Figure 3-19] CentOS 7 Setup complete

3.2 Extract the installation files

User needs to create the gk-2a folder in the installation path of GK-2A receiving system, and release the provided compressed file.

- Decompress command: tar -zxvf gk-2a.tar.gz

```
[mdus@localhost ~]$ tar -zxvf gk-2a.tar.gz
gk-2a/resource/map/world_shape/World_ver.2015/(2).SHP/WLD_RIVER_LS.shp
gk-2a/setting/joblist/manual_job.joblist
gk-2a/log/productlog/IMG_ENH_23_SWIR_20190529_063920_01.hrit.log
gk-2a/log/xritheaderlog/IMG_ENH_22_IR2_20190529_062410_03.hrit.header
gk-2a/resource/map/world_shape/World_ver.2015/(2).SHP/WLD_PREMI_AS.prj
gk-2a/install/rpm/perl-Compress-Raw-Zlib-2.061-4.el7.x86_64.rpm
gk-2a/log/xritheaderlog/IMG_ENH_23_IR2_20190529_063920_02.hrit.header
gk-2a/schedule/manam_storage/ADD_ANT_01_20190515_113500_00.hrit
gk-2a/bin/receiver.sh
gk-2a/lib/libLibProjection.so.1
gk-2a/schedule/manam_storage/ADD_ANT_01_20180107_113500_00.hrit
gk-2a/schedule/manam_storage/ADD_ANT_01_20180206_113500_00.hrit
gk-2a/resource/map/world_shape/shapeLib-1.4.0/shapelib-1.4.0/Makefile.am
gk-2a/log/productlog/IMG_ENH_22_SWIR_20190529_062410_02.hrit.log
gk-2a/schedule/manam_storage/ADD_ANT_01_20171119_113500_00.hrit
gk-2a/log/xritheaderlog/IMG_ENH_21_WV_20190529_060920_02.hrit.header
gk-2a/log/productlog/coms mi le1b com fd005ge 20190529060010.png.log
```

[Figure 3-20] Receiving S/W decompress

3.3 Install Package

3.3.1 Install Qt

User needs to install Qt for GK-2A Receiving System execution environment installation.

Next, grant execute permission to the qt-opensource-linux-x64-5.11.1.run file in the Install folder under the gk-2a installation path.

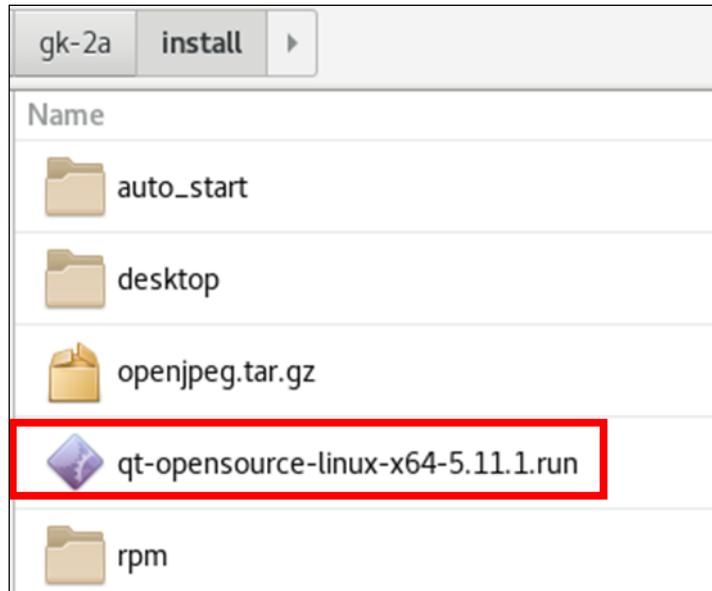
- Commands that can grant execute permission : chmod +x qt-opensource-linux-x64

```
[mdus@localhost install]$ chmod +x qt-opensource-linux-x64-5.11.1.run
[mdus@localhost install]$ ll
total 2187120
drwxrwxr-x. 2 mdus mdus      26 Jul 11 22:07 auto_start
drwxrwxr-x. 2 mdus mdus      72 Jul 11 22:07 desktop
-rw-r--r--. 1 mdus mdus  90416024 May 24 15:55 openjpeg.tar.gz
-rwxr-xr-x. 1 mdus mdus 1307835489 Jul 12 2019 qt-opensource-linux-x64-5.11.1.run
drwxr-xr-x. 2 mdus mdus     4096 Jul 11 22:07 rpm
drwxr-xr-x. 2 mdus mdus      203 Jul 11 22:07 rpm2
[mdus@localhost install]$
```

[Figure 3-21] Grant execute permission to qt-opensource-linux-x64-5.11.1.run

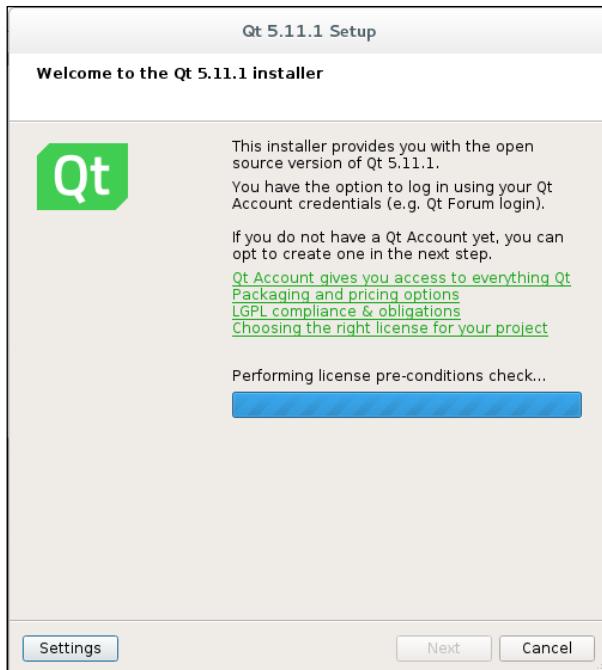
Execute the installation file by double-clicking qt-opensource-linux-x64-5.11.1.run or by using following command.

- File execution: ./qt-opensource-linux-x64-5.11.1.run



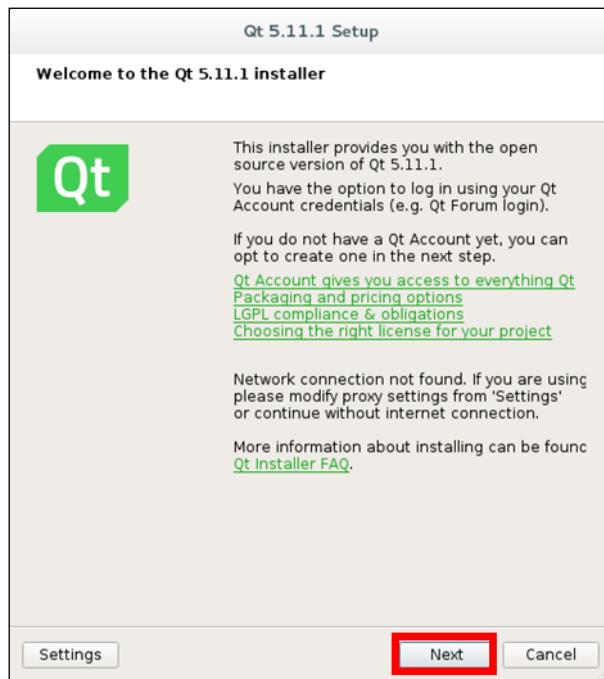
[Figure 3-22] qt-opensource-linux-x64-5.11.1.run execution

When user runs qt-opensource-linux-x64-5.11.1.run, click on "Next" button that is activated after license confirmation.



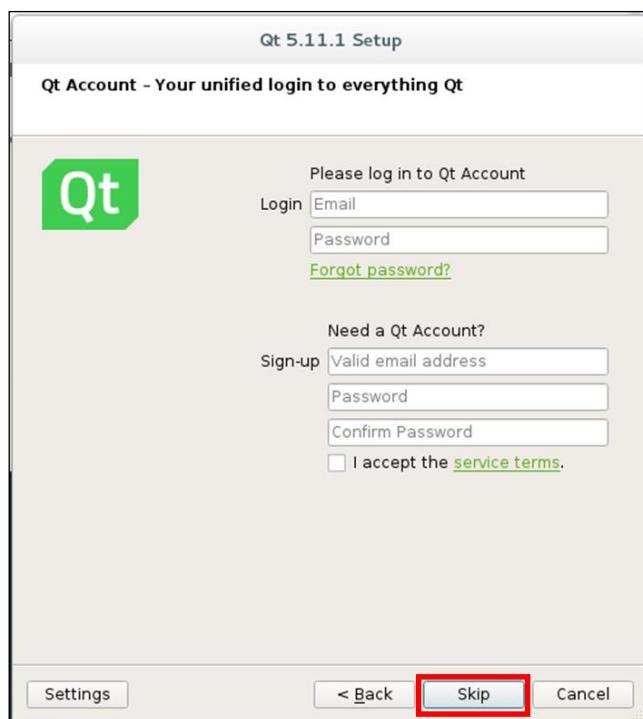
[Figure 3-23] qt license check

Click "Next" to proceed to the next window.



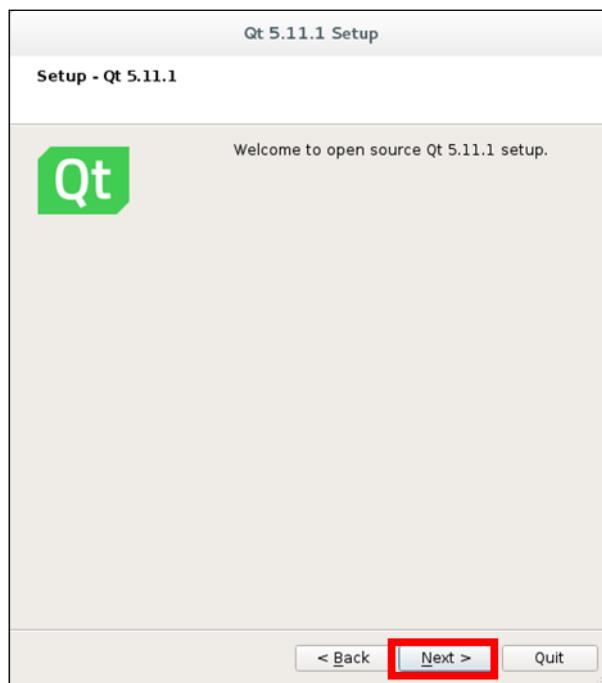
[Figure 3-24] qt license check complete

Click the "Skip" button at the bottom to proceed to the next step.



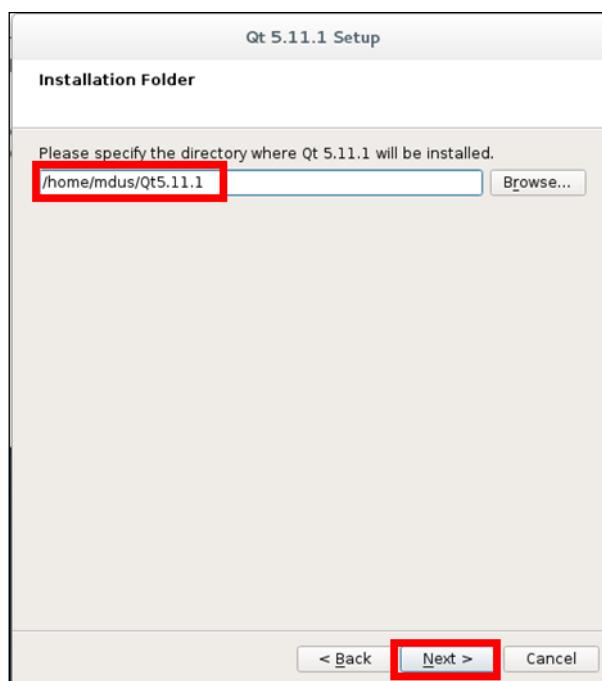
[Figure 3-25] qt Account Setup window

Click the "Next" button to proceed to installation path setup.



[Figure 3-26] Qt Setup

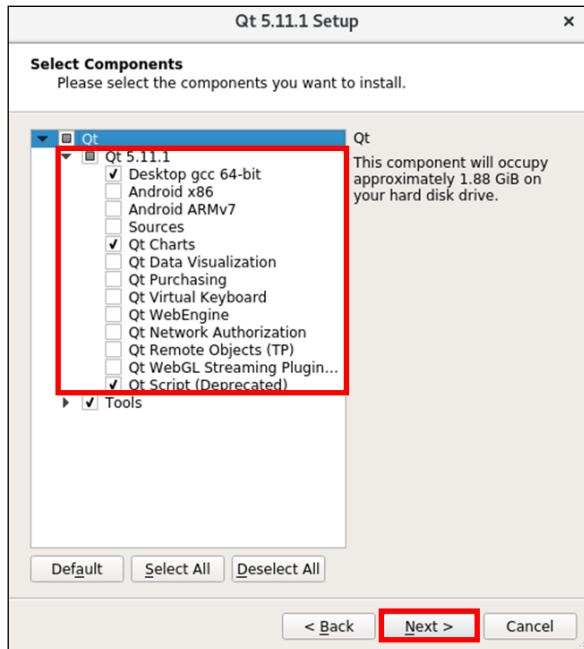
The installation path is set to a sub-[Qt5.11.1] of the GK-2A user account then click the "Next" button.



[Figure 3-27] Qt Install path setup

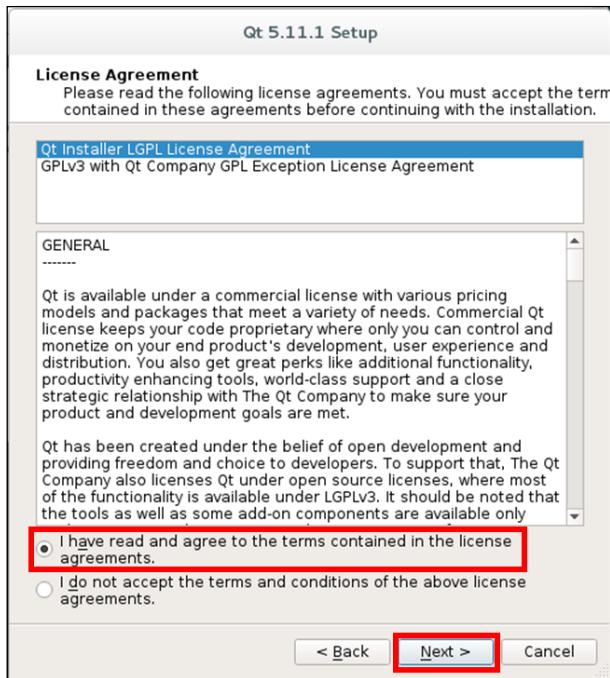
The Qt installation components are shown in [Figure 2-28] below.

Select Desktop gcc 64-bit, Qt Charts, Qt Script (Deprecated) on the sub-Qt 5.11.1 and click the "Next" button.



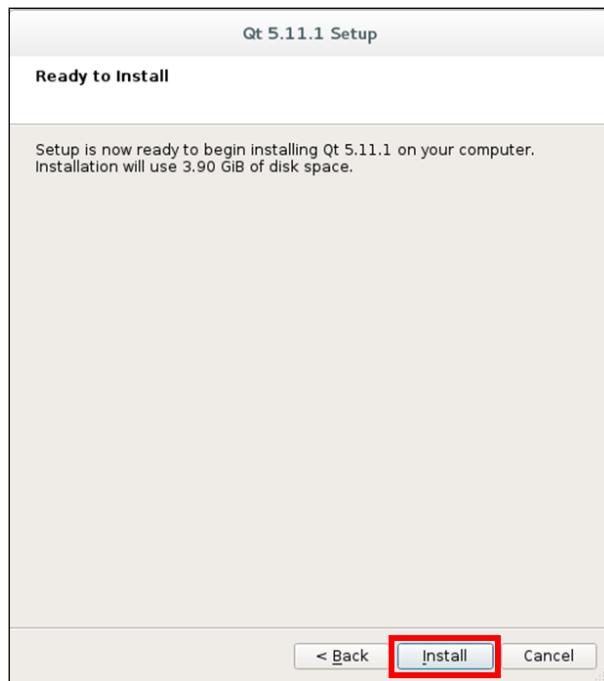
[Figure 3-28] Qt installation components setup window

On the License Agreement window, check the License agreement and click the "Next" button.



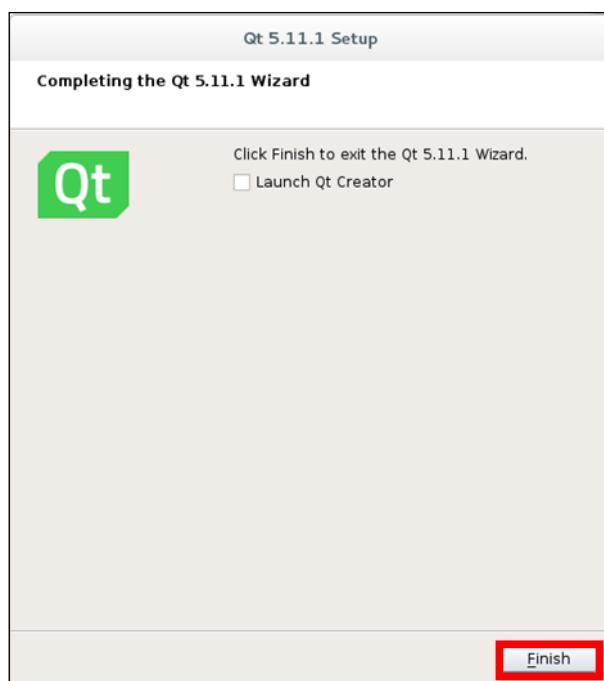
[Figure 3-29] Qt Installation license agreement setup window

Click the Install button on the bottom right of the installation preparation window to proceed with the installation.



[Figure 3-30] Qt Installation Start

When installation is complete, uncheck Launch Qt Creator as shown in [Figure 2-31]. Next, click the "Finish" button to complete the Qt installation.



[Figure 3-31] Qt Installation complete

3.3.2 Install RPM

You need to install the RPM package for environment installation.

Next, go to the subdirectory ./install/rpm in the provided gk-2a installation file.

- Move Command : cd /home/mdus/gk-2a/install/rpm

```
[mdus@localhost ~]$ ls
Desktop  Downloads  Pictures  Qt5.11.1  Videos  gk-2a.tar.gz
Documents  Music      Public    Templates  gk-2a
[mdus@localhost ~]$ pwd
/home/mdus
[mdus@localhost ~]$ cd /home/mdus/gk-2a/install/rpm
[mdus@localhost rpm]$ pwd
/home/mdus/gk-2a/install/rpm
```

[Figure 3-32] Move rpm install path

After moving the folder, check that all rpm files in [Table 3] are present, and grant execute permission to all files using the following command.

- Execute permission command : chmod +x *

```
[mdus@localhost rpm]$ pwd
/home/mdus/gk-2a/install/rpm
[mdus@localhost rpm]$ chmod +x *
[mdus@localhost rpm]$
```

[Figure 3-33] RPM Execute permission

The rpm package can be installed with root authority. So, perform a user switch to become root.

If root access is confirmed, use the following command to install the rpm package.

- Install command: rpm -Uvh [Package file name]

[Table 3-1] RPM install sequence

Order	Package	Package file
1	cmake	cmake-2.8.12.2-2.el7.x86_64.rpm
2	cpp	cpp-4.8.5-36.el7_6.2.x86_64.rpm
3	lib	libgcc-4.8.5-36.el7_6.2.x86_64.rpm
4		libfortran-4.8.5-36.el7_6.2.x86_64.rpm
5		libgomp-4.8.5-36.el7_6.2.x86_64.rpm
6		libquadmath-4.8.5-36.el7_6.2.x86_64.rpm
7		libstdc++-4.8.5-36.el7_6.2.x86_64.rpm
8		libstdc++-devel-4.8.5-36.el7_6.2.x86_64.rpm
9		gcc-4.8.5-36.el7_6.2.x86_64.rpm
10	gcc	gcc-c++-4.8.5-36.el7_6.2.x86_64.rpm

11	perl	perl-Data-Dumper-2.145-3.el7.x86_64.rpm
12		perl-Net-Daemon-0.48-5.el7.noarch.rpm
13		perl-Compress-Raw-Zlib-2.061-4.el7.x86_64.rpm
14		perl-Compress-Raw-Bzip2-2.061-3.el7.x86_64.rpm
15		perl-IO-Compress-2.061-2.el7.noarch.rpm
16		perl-PIRPC-0.2020-14.el7.noarch.rpm
17		perl-DBI-1.627-4.el7.x86_64.rpm
18		perl-DBD-MySQL-4.023-6.el7.x86_64.rpm
19	MariaDB	mariadb-5.5.60-1.el7_5.x86_64.rpm
20		mariadb-libs-5.5.60-1.el7_5.x86_64.rpm
21		mariadb-server-5.5.60-1.el7_5.x86_64.rpm
22	rpmforge	rpmforge-release-0.5.3-1.el7.rf.x86_64.rpm

When all rpm packages are complete, quit the root with the exit command.

- Exit status command : exit

```
[root@localhost rpm2]# exit
exit
[mdus@localhost rpm2] $
```

[Figure 3-34] Exit root

Move to the subdirectory ./install/rpm2 in the provided GK-2A installation file and install the additional rpm package.

- Move command : cd /home/mdus/gk-2a/install/rpm2

```
[mdus@localhost rpm] $ cd /home/mdus/gk-2a/install/rpm2/
[mdus@localhost rpm2] $ pwd
/home/mdus/gk-2a/install/rpm2
```

[Figure 3-35] Move rpm2 installation path

You need to grant execute permission to all files in the rpm2 folder, such as the rpm folder.

- Execute permission command : chmod +x *

```
[mdus@localhost rpm2]$ pwd
/home/mdus/gk-2a/install/rpm2
[mdus@localhost rpm2]$ chmod +x *
[mdus@localhost rpm2]$ ls
gedit-3.28.1-1.el7.x86_64.rpm      zlib-1.2.7-18.el7.x86_64.rpm
ntpdate-4.2.6p5-28.el7.centos.x86_64.rpm  zlib-devel-1.2.7-18.el7.x86_64.rpm
szip-2.1-1.sdl7.x86_64.rpm
[mdus@localhost rpm2]$ █
```

[Figure 3-36] RPM2 Execute permission

Before installation, use the su command to switch to root and proceed with the installation.

- Installation command : rpm -Uvh [Package file name]

[Table 3-2] RPM2 install sequence

Order	Package	Package file
1	gedit	gedit-3.28.1-1.el7.x86_64.rpm
2	zlib	zlib-devel-1.2.7-18.el7.x86_64.rpm
3	szip	szip-2.1-1.sdl7.x86_64.rpm
4	zlib	zlib-1.2.7-18.el7.x86_64.rpm
5	ntpdate	ntpdate-4.2.6p5-28.el7.centos.x86_64.rpm

When all rpm packages are complete, quit the root with the exit command such as [Figure 3-34].

3.3.3 Install Openjpeg

This is how to install openjpeg provided.

User needs to move to subdirectory ./install/ in the provided gk-2a installation file

- Move command : cd /home/mdus/gk-2a/install/

```
[mdus@localhost rpm2]$ cd /home/mdus/gk-2a/install/
[mdus@localhost install]$ pwd
/home/mdus/gk-2a/install
```

[Figure 3-37] Move openjpeg installation path

Openjpeg.tar.gz 압축 파일을 ./install/경로에 openjpeg 폴더 이름으로 압축을 해제한다.

Next, extract the Openjpeg.tar.gz to the openjpeg folder in the ./install/ path.

- Extract command : tar -zxfv openjpeg.tar.gz

```
[mdus@localhost install]$ pwd
/home/mdus/gk-2a/install
[mdus@localhost install]$ ls
auto_start openjpeg.tar.gz rpm
desktop qt-opensource-linux-x64-5.11.1.run rpm2
[mdus@localhost install]$ tar -zvxf openjpeg.tar.gz
openjpeg/src/bin/jpip/opj_viewer_xerces/src/JPZXMLparser.java
openjpeg/src/bin/jp2/opj_compress.c
openjpeg/src/lib/openmj2/jpt.c
openjpeg/src/bin/jpip/opj_viewer/src/PnmImage.java
openjpeg/src/bin/jp2/converttif.c
openjpeg/wrapping/java/openjp2/org_openJpeg_OpenJPEGJavaDecoder.h
openjpeg/src/lib/openjp2/j2k.c
openjpeg/src/bin/jp2/opj_dump.c
openjpeg/thirdparty/libpng/pngrtran.c
openjpeg/src/lib/openjp2/j2k.h
```

[Figure 3-38] Extract openjpeg.tar.gz

Create a build folder in the openjpeg folder, move to the build folder, and build in [Table 3-3].

- Path move command : cd /home/mdus/gk-2a/install/openjpeg/
- Create build folder command : mkdir build
- Move build path command : cd /home/mdus/gk-2a/install/openjpeg/build/

```
[mdus@localhost install]$ ls
auto_start openjpeg qt-opensource-linux-x64-5.11.1.run rpm2
desktop openjpeg.tar.gz rpm
[mdus@localhost install]$ cd /home/mdus/gk-2a/install/openjpeg/
[mdus@localhost openjpeg]$ pwd
/home/mdus/gk-2a/install/openjpeg
[mdus@localhost openjpeg]$ ls
AUTHORS.md CTestConfig.cmake NEWS.md appveyor.yml scripts thirdparty
CHANGELOG.md INSTALL.md README.md cmake src tools
CMakeLists.txt LICENSE THANKS.md doc tests wrapping
[mdus@localhost openjpeg]$ mkdir build
[mdus@localhost openjpeg]$ ls
AUTHORS.md INSTALL.md THANKS.md doc thirdparty
CHANGELOG.md LICENSE appveyor.yml scripts tools
CMakeLists.txt NEWS.md build src wrapping
CTestConfig.cmake README.md cmake tests
[mdus@localhost openjpeg]$ cd /home/mdus/gk-2a/install/openjpeg/build/
[mdus@localhost build]$ pwd
/home/mdus/gk-2a/install/openjpeg/build
```

[Figure 3-39] Move openjpeg build

[Table 3-3] is the order to build openjpeg from the build folder.

[Table 3-3] openjpeg build sequence

Order	Command
1	cmake ../
2	make
3	su
4	make install
5	ldconfig

4. SETUP OF RECEIVING SOFTWARE

4.1 Setup firewall

Additional firewall policies are set up to install the GK-2A receiving system environment.

After setting additional firewall policies for the three ports to receive the data, reload the firewall.

[Table 4-1] Firewall modification command sequence

순서	명령어
1	firewall-cmd --permanent --add-port=3306/tcp
2	firewall-cmd --permanent --add-port=5004/tcp
3	firewall-cmd --permanent --add-port=5005/tcp
4	firewall-cmd --reload

```
[root@localhost build] # firewall-cmd --permanent --add-port=3306/tcp
success
[root@localhost build] # firewall-cmd --permanent --add-port=5004/tcp
success
[root@localhost build] # firewall-cmd --permanent --add-port=5005/tcp
success
[root@localhost build] # firewall-cmd --reload
success
[root@localhost build] #
```

[Figure 4-1] Add & reload firewall

4.2 Setup Database

You need to set the Database to install environment.

Next, run the installed MariaDB to set permissions.

- MariaDB execute command : systemctl start mariadb
- MariaDB status check command : systemctl status mariadb

```
[root@localhost build] # systemctl start mariadb
[root@localhost build] # systemctl status mariadb
● mariadb.service - Mariadb database server
   Loaded: loaded (/usr/lib/systemd/system/mariadb.service; disabled; vendor preset: disabled)
   Active: active (running) since 금 2019-07-12 14:51:00 KST; 11s ago
     Process: 18714 ExecStart=/usr/libexec/mariadb-wait-ready $MAINPID (code=exited, status=0/SUCCESS)
     Process: 18679 ExecStartPre=/usr/libexec/mariadb-prepare-db-dir %n (code=exited, status=0/SUCCESS)
   Main PID: 18713 (mysqld_safe)
      Tasks: 20
     CGroup: /system.slice/mariadb.service
             └─18713 /bin/sh /usr/bin/mysqld_safe --basedir=/usr
                   ├─18875 /usr/libexec/mysqld --basedir=/usr --datadir=/var/lib/mysql --plugin-dir=/usr/lib64/mys...
 7월 12 14:50:58 localhost.localdomain systemd[1]: Starting MariaDB database server...
 7월 12 14:50:58 localhost.localdomain mariadb-prepare-db-dir[18679]: Database MariaDB is probably initi...
 7월 12 14:50:58 localhost.localdomain mysqld_safe[18713]: 190712 14:50:58 mysqld_safe Logging to '/var/...
 7월 12 14:50:58 localhost.localdomain mysqld_safe[18713]: 190712 14:50:58 mysqld_safe Starting mysqld ...
 7월 12 14:51:00 localhost.localdomain systemd[1]: Started MariaDB database server.
Hint: Some lines were ellipsized, use -l to show in full.
[root@localhost build] #
```

[Figure 4-2] MariaDB execute window

Access the root account to MariaDB (the password is blank by default). If the connection succeeds, the prompt is changed to "MariaDB [(none)]>".

```
[root@localhost build]# mysql -u root -p
Enter password:
Welcome to the MariaDB monitor.  Commands end with ; or \g.
Your MariaDB connection id is 2
Server version: 5.5.60-MariaDB MariaDB Server

Copyright (c) 2000, 2018, Oracle, MariaDB Corporation Ab and others.

Type 'help;' or '\h' for help. Type '\w' to clear the current input statement.

MariaDB [(none)]> ]
```

[Figure 4-3] MariaDB root access window

Confirm the user to change MariaDB user permission and password. Also, use the following command to modify the permission and passwords of the users.

- User check command : SELECT User, Host FROM mysql.user WHERE Host <> 'localhost';
- Modifying command of User Permissions and Passwords:
GRANT ALL PRIVILEGES ON *.* TO 'root'@'%' IDENTIFIED BY 'qwer!2345' WITH GRANT OPTION;

```
MariaDB [(none)]> SELECT User, Host FROM mysql.user WHERE Host <> 'localhost';
+-----+-----+
| User | Host   |
+-----+-----+
| root | 127.0.0.1 |
| root | ::1    |
|      | localhost.localdomain |
| root | localhost.localdomain |
+-----+
4 rows in set (0.01 sec)

MariaDB [(none)]> GRANT ALL PRIVILEGES ON *.* TO 'root'@ '%' IDENTIFIED BY 'qwer!2345' WITH GRANT OPTION;
Query OK, 0 rows affected (0.00 sec)

MariaDB [(none)]> ]
```

[Figure 4-4] Modifying MariaDB user permissions and passwords

Next, create a database named gk2a_receiver_db, select and save the generated gk2a_receiver_db.

- Database generation command : CREATE DATABASE gk2a_receiver_db;
- Database selection command : USE gk2a_receiver_db;
- Save changes command : FLUSH PRIVILEGES;

```
MariaDB [(none)]> create database gk2a_receiver_db;
Query OK, 1 row affected (0.00 sec)

MariaDB [(none)]> use gk2a_receiver_db
Database changed
MariaDB [gk2a_receiver_db]> FLUSH PRIVILEGES;
Query OK, 0 rows affected (0.00 sec)

MariaDB [gk2a_receiver_db]>
```

[Figure 4-5] MariaDB Database generation & changes window

Create a table using the selected gk2a_receiver_db and the query in [Table 4-2].

[Table 4-2] Table generation command sequence

Order	Command
1	<pre>CREATE TABLE `tb_product` (`satellite` VARCHAR(4) NOT NULL, `service` VARCHAR(5) NOT NULL, `recvstarttime` DATETIME NOT NULL, `abbr` VARCHAR(4) NOT NULL, `productid` VARCHAR(16) NOT NULL DEFAULT '', `observationtime` DATETIME NULL DEFAULT NULL, `filename` VARCHAR(64) NOT NULL, `procstarttime` DATETIME NULL DEFAULT NULL, `procendtime` DATETIME NULL DEFAULT NULL, `executeflag` TINYINT(4) NULL DEFAULT NULL, `exitcode` SMALLINT(6) NULL DEFAULT NULL, `procdir` VARCHAR(256) NULL DEFAULT NULL, `areaname` VARCHAR(32) NULL DEFAULT NULL, `fileformat` VARCHAR(8) NULL DEFAULT NULL, PRIMARY KEY (`satellite`, `service`, `recvstarttime`, `abbr`, `productid`))COLLATE='utf8_general_ci' ENGINE=InnoDB;</pre>

2	<pre> CREATE TABLE `tb_recvproc` (`satellite` VARCHAR(4) NOT NULL, `service` VARCHAR(5) NOT NULL, `recvstarttime` DATETIME NOT NULL, `recvendtime` DATETIME NOT NULL, `abbr` VARCHAR(4) NOT NULL, `abbrseq_plan` VARCHAR(3) NULL DEFAULT NULL, `broadcast` VARCHAR(1) NULL DEFAULT NULL, `abbrseq_result` VARCHAR(3) NULL DEFAULT NULL, `observationtime` DATETIME NULL DEFAULT NULL, `recvstatus` TINYINT(3) UNSIGNED NULL DEFAULT NULL, `cntofrecvseg` SMALLINT(5) UNSIGNED NULL DEFAULT NULL, `cntofplanseg` SMALLINT(5) UNSIGNED NULL DEFAULT NULL, `procstatus` TINYINT(3) UNSIGNED NULL DEFAULT NULL, `procstarttime` DATETIME NULL DEFAULT NULL, `procendtime` DATETIME NULL DEFAULT NULL, `cntofprocprod` SMALLINT(5) UNSIGNED NULL DEFAULT NULL, `cntofplanprod` SMALLINT(5) UNSIGNED NULL DEFAULT NULL, PRIMARY KEY (`satellite`, `service`, `recvstarttime`, `recvendtime`, `abbr`))COLLATE='utf8_general_ci' ENGINE=InnoDB; </pre>
3	<pre> CREATE TABLE `tb_rfsignal` (`generatedtime` DATETIME NOT NULL, `signallevel` DOUBLE NOT NULL, `ber` DOUBLE NOT NULL, PRIMARY KEY (`generatedtime`))COLLATE='utf8_general_ci' ENGINE=InnoDB; </pre>
4	<pre> CREATE TABLE `tb_segmentacq` (`satellite` VARCHAR(4) NOT NULL, `service` VARCHAR(5) NOT NULL, `recvstarttime` DATETIME NOT NULL, `abbr` VARCHAR(4) NOT NULL, `filename` VARCHAR(64) NOT NULL, `acqtype` TINYINT(4) NOT NULL, `acqtime` DATETIME NOT NULL, PRIMARY KEY (`satellite`, `service`, `recvstarttime`, `abbr`, `filename`))COLLATE='utf8_general_ci' ENGINE=InnoDB; </pre>

When the table creation query is applied, check the message "Query OK, 0 rows affected (0.00 sec)" as shown in [Figure 4-6].

```
MariaDB [gk2a_receiver_db]> CREATE TABLE `tb_segmentacq` (
-> `satellite` VARCHAR(4) NOT NULL,
-> `service` VARCHAR(5) NOT NULL,
-> `recvstarttime` DATETIME NOT NULL,
-> `abbr` VARCHAR(4) NOT NULL,
-> `filename` VARCHAR(64) NOT NULL,
-> `acqtype` TINYINT(4) NOT NULL,
-> `acqtime` DATETIME NOT NULL,
-> PRIMARY KEY (`satellite`, `service`, `recvstarttime`, `abbr`, `filename`)
-> )
-> COLLATE='utf8_general_ci'
-> ENGINE=InnoDB
```
Query OK, 0 rows affected (0.00 sec)
```

[Figure 4-6] MariaDB Table generation & result window

After executing all the queries in [Table 4-2], terminate the MariaDB connection. If it exits normally, "Bye" is displayed.

- MariaDB connection termination command : exit

```
MariaDB [gk2a_receiver_db]> exit
Bye
[root@localhost build] #
```

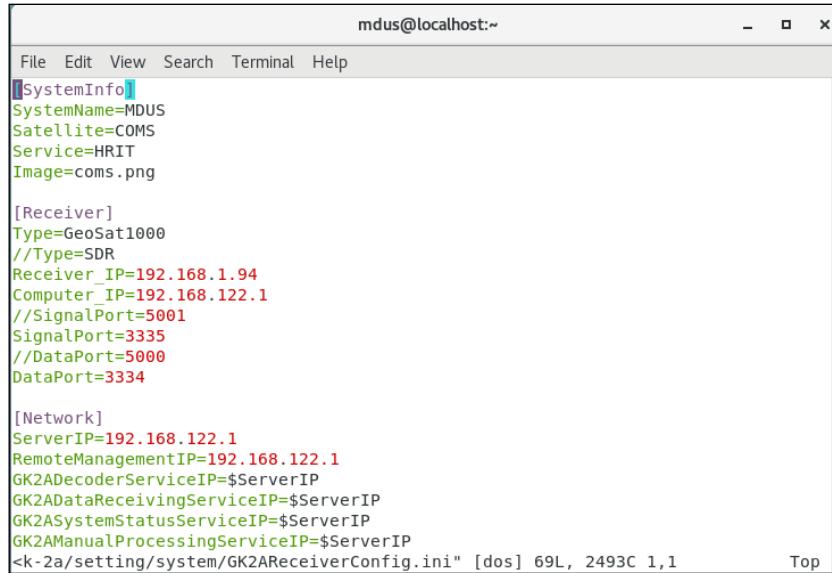
[Figure 4-7] MariaDB connection termination window

### 4.3 Setup Receiver & Server IP

Modify the IP of the receiver and server for installation of the GK-2A MDUS receiving S/W environment.

Execute the Editor program to edit GK2ARceiverConfig.ini file of the subdirectory ./gk-2a/setting/system in the provided gk-2a installation file

- Edit execution command: vim \$install path/GK2ARceiverConfig.ini



```

mdus@localhost:~
File Edit View Search Terminal Help
[SystemInfo]
SystemName=MDUS
Satellite=COMS
Service=HRIT
Image=coms.png

[Receiver]
Type=GeoSat1000
//Type=SDR
Receiver_IP=192.168.1.94
Computer_IP=192.168.122.1
//SignalPort=5001
SignalPort=3335
//DataPort=5000
DataPort=3334

[Network]
ServerIP=192.168.122.1
RemoteManagementIP=192.168.122.1
GK2ADecoderServiceIP=$ServerIP
GK2ADataReceivingServiceIP=$ServerIP
GK2ASystemStatusServiceIP=$ServerIP
GK2AManualProcessingServiceIP=$ServerIP
<k-2a/setting/system/GK2ARceiverConfig.ini" [dos] 69L, 2493C 1,1
 Top

```

**[Figure 4-8]** GK2ARceiverConfig.ini execution window

When you open the GK2ARceiverConfig.ini file, the attributes are set by default as shown [Figure 4-8]. Modify and save the contents of [Receiver] and [Network] among the attribute items as shown below.

- [Receiver]
  - Receiver\_IP=[Receiver IP]
  - Computer\_IP=[MDUS server IP]
- [Network]
  - ServerIP=[MDUS server IP]
  - RemoteManagementIP=[MDUS server IP]

```

[Receiver]
Type=GeoSat1000
//Type=SDR
Receiver_IP=192.168.1.94
Computer IP=192.168.122.1
//SignalPort=5001
SignalPort=3335
//DataPort=5000
DataPort=3334

[Network]
ServerIP=192.168.122.1
RemoteManagementIP=192.168.122.1
GK2ADecoderServiceIP=$ServerIP

```

[Figure 4-9] Modify GK2AReceiverConfig.ini file

The MDUS can receive HRIT data with SDR Dongle. If user needs SDR, the following instructions can be followed:

- The SDR software must send QPSK symbol stream to host IP as UDP packet length 1024.
- The SDR software must send Signal Level \* 100 to host IP as UDP packet length 4 bytes.

#### 4.4 Setting Environment variables

##### 4.4.1 Setup ~/.bash\_profile

When the IP setting is completed, register the environment variable to execute the GK-2A receiving S/W.

Environment variables are modified using the vi editor in the ~ / .bash\_profile file for the user account.

- Edit execution command: vim ~/.bash\_profile

```
mdus@localhost:~$
File Edit View Search Terminal Help
.bash_profile

Get the aliases and functions
if [-f ~/.bashrc]; then
 . ~/.bashrc
fi

User specific environment and startup programs

PATH=$PATH:$HOME/.local/bin:$HOME/bin

export PATH
~
```

[Figure 4-10] Execute ~./bash\_profile

Use the vi editor to add the related lib path of the active ~ / .bash\_profile and the GK-2A Receiving S/W installation path.

```
File Edit View Search Terminal Help
.bash_profile

Get the aliases and functions
if [-f ~/.bashrc]; then
 . ~/.bashrc
fi

#User specific environment and startup programs

PATH=$PATH:$HOME/.local/bin:$HOME/bin:/home/mdus/gk-2a/bin
export LD_LIBRARY_PATH=/home/mdus/gk-2a/lib:/home/mdus/Qt5.11.1/5.11.1/gcc_64/lib/
export GK2AReceiverInstallPath=/home/mdus/gk-2a/
export PATH
```

[Figure 4-11] ~./bash\_profile changes

After modifying ~ / .bash\_profile, execute the "source" command as shown below to apply the modified information.

- Apply command : source ~./bash\_profile

```
[root@localhost mdus]# source ~./bash_profile
[root@localhost mdus]#
```

[Figure 4-12] Applying modified ~./bash\_profile

#### 4.4.2 Setup /etc/ld.so.conf

Execute /etc/ld.so.conf file.

- Edit execution command : vim /etc/ld.so.conf

A screenshot of a terminal window with a light gray header bar containing the words "File", "Edit", "View", "Search", "Terminal", and "Help". Below the header, the file content is displayed in a white text area:  
include ld.so.conf.d/\*.conf  
~

[Figure 4-13] /etc/ld.so.conf execution

Modify /etc/ld.so.conf file.

A screenshot of a terminal window with a light gray header bar containing the words "File", "Edit", "View", "Search", "Terminal", and "Help". Below the header, the file content is displayed in a white text area. A red rectangular box highlights the last two lines of the configuration:  
include ld.so.conf.d/\*.conf  
/home/mdus/gk-2a/lib  
/home/mdus/Qt5.11.1/5.11.1/gcc\_64/lib  
~

[Figure 4-14] /etc/ld.so.conf changes

After modifying the /etc/ld.so.conf file, use the "ldconfig" command as shown below.

A screenshot of a terminal window with a light gray header bar containing the words "[root@localhost build]" and "#". Below the header, the command "ldconfig" is typed and executed, followed by a blank line.  
[root@localhost build]# ldconfig  
[root@localhost build]#

[Figure 4-15] ldconfig execution

#### 4.4.3 Setup /etc/my.cnf

Execute /etc/my.cnf file.

- Edit execution command : vim /etc/my.cnf

A screenshot of a terminal window with a light gray header bar containing the words "[mysqld]", "File", "Edit", "View", "Search", "Terminal", and "Help". Below the header, the file content is displayed in a white text area:  
[mysqld]  
datadir=/var/lib/mysql  
socket=/var/lib/mysql/mysql.sock  
# Disabling symbolic-links is recommended to prevent assorted security risks  
symbolic-links=0  
# Settings user and group are ignored when systemd is used.  
# If you need to run mysqld under a different user or group,  
# customize your systemd unit file for mariadb according to the  
# instructions in http://fedoraproject.org/wiki/Systemd  
  
[mysqld\_safe]  
log-error=/var/log/mariadb/mariadb.log  
pid-file=/var/run/mariadb/mariadb.pid  
  
#  
# include all files from the config directory  
#  
!includedir /etc/my.cnf.d  
~

[Figure 4-16] /etc/my.cnf execution window

Add the "interactive\_timeout" and "wait\_timeout" attributes to the /etc/my.cnf file executed by the vi editor as shown in [Figure 2-56] to complete the setting.

```
[mysqld]
datadir=/var/lib/mysql
socket=/var/lib/mysql/mysql.sock
interactive_timeout = 31536000
wait_timeout = 31536000
Disabling symbolic-links is recommended to prevent assorted security risks
symbolic-links=0
Settings user and group are ignored when systemd is used.
If you need to run mysqld under a different user or group,
customize your systemd unit file for mariadb according to the
instructions in http://fedoraproject.org/wiki/Systemd

[mysqld_safe]
log-error=/var/log/mariadb/mariadb.log
pid-file=/var/run/mariadb/mariadb.pid

#
include all files from the config directory
#
!includedir /etc/my.cnf.d
```

[Figure 4-17] /etc/my.cnf changes

## 4.5 Time synchronization settings

Run the time synchronization setup file (/etc/ntp.conf) as a vi editor to set it to the ntp server IP provided by the agency. (Comment out unused entries using #)

- Edit execution command : vim /etc/ntp.conf

```
driftfile /var/lib/ntp/drift

Permit time synchronization with our time source, but do not
permit the source to query or modify the service on this system.
restrict default nomodify notrap nopeer noquery

Permit all access over the loopback interface. This could
be tightened as well, but to do so would effect some of
the administrative functions.
restrict 127.0.0.1
restrict ::1

Hosts on local network are less restricted.
#restrict 192.168.1.0 mask 255.255.255.0 nomodify notrap

Use public servers from the pool.ntp.org project.
Please consider joining the pool (http://www.pool.ntp.org/join.html).
server 0.centos.pool.ntp.org iburst
#server 1.centos.pool.ntp.org iburst
#server 2.centos.pool.ntp.org iburst
#server 2.centos.pool.ntp.org iburst
#server 3.centos.pool.ntp.org iburst
```

25,1 5%

[Figure 4-18] /etc/ntp.conf comment out

Modify the /etc/ntp.conf file and add the ntp service to the firewall policy as shown in [Table 4-3], and then restart the firewall and ntpd module.

**[Table 4-3]** Time synchronization firewall command

| Order | Command                                    |
|-------|--------------------------------------------|
| 1     | firewall-cmd --add-service=ntp --permanent |
| 2     | firewall-cmd --reload                      |
| 3     | systemctl start ntpd                       |
| 4     | systemctl enable ntpd                      |

```
[root@localhost system]# firewall-cmd --add-service=ntp --permanent
success
[root@localhost system]# firewall-cmd --reload
success
[root@localhost system]# systemctl start ntpd
[root@localhost system]# systemctl enable ntpd
Created symlink from /etc/systemd/system/multi-user.target.wants/ntp.service to
/usr/lib/systemd/system/ntp.service.
[root@localhost system]#
```

**[Figure 4-19]** Setting Time synchronization firewall

## 5. EXECUTE OF RECEIVING SOFTWARE

### 5.1 Execute Mariadb

Re-do the database by completing the environment setup.

Activate and run MariaDB.

- MariaDB activation command : systemctl enable mariadb
- MariaDB execution command : systemctl start mariadb

```
[root@localhost build]# systemctl enable mariadb
Created symlink from /etc/systemd/system/multi-user.target.wants/mariadb.service
to /usr/lib/systemd/system/mariadb.service
[root@localhost build]# systemctl start mariadb
[root@localhost build]# systemctl status mariadb
● mariadb.service - MariaDB database server
 Loaded: loaded (/usr/lib/systemd/system/mariadb.service; enabled; vendor pres
 et: disabled)
 Active: active (running) since Fri 2019-07-12 14:51:00 KST; 2h 2min ago
 Main PID: 18713 (mysqld_safe)
 CGroup: /system.slice/mariadb.service
 └─18713 /bin/sh /usr/bin/mysqld_safe --basedir=/usr
 └─18875 /usr/libexec/mysqld --basedir=/usr --datadir=/var/lib/mysq...
Jul 12 14:50:58 localhost.localdomain systemd[1]: Starting MariaDB database s...
Jul 12 14:50:58 localhost.localdomain mariadb-prepare-db-dir[18679]: Database...
Jul 12 14:50:58 localhost.localdomain mysqld_safe[18713]: 190712 14:50:58 mys...
Jul 12 14:50:58 localhost.localdomain mysqld_safe[18713]: 190712 14:50:58 mys...
Jul 12 14:51:00 localhost.localdomain systemd[1]: Started MariaDB database se...
Hint: Some lines were ellipsized, use -l to show in full.
[root@localhost build]#
```

**[Figure 5-1]** Run MariaDB

## 5.2 Receiver S/W auto-run setting

When the GK-2A receiving S/W environment is installed, setup the auto-run of the installed GK-2A receiving S/W.

Copy the subdirectory ./install/auto\_start/mdus.service in the provided gk-2a installation path to /etc/systemd/system/mdus.service by using root authority. Grant 644 permissions to the copied "mdus.service" file.

- Folder moving command : cd /home/mdus/gk-2a/install/auto\_start
- File copy command : cp mdus.service /etc/systemd/system/mdus.service
- Permission grant command : chmod 644 /etc/systemd/system/mdus.service

```
[root@localhost auto_start]# cd /home/mdus/gk-2a/install/auto_start
[root@localhost auto_start]# pwd
/home/mdus/gk-2a/install/auto_start
[root@localhost auto_start]# ls
mdus.service
[root@localhost auto_start]# cp mdus.service /etc/systemd/system/mdus.service
[root@localhost auto_start]# chmod 644 /etc/systemd/system/mdus.service
[root@localhost auto_start]# systemctl enable mdus
```

[Figure 5-2] mdus.service file copy & Permission grant

Apply and run the "mdus" service after granting permissions to the mdus.service file.

- Activation command : systemctl enable mdus
- Execution command : systemctl start mdus

```
[root@localhost system]# systemctl enable mdus
Created symlink from /etc/systemd/system/multi-user.target.wants/mdus.service to
/etc/systemd/system/mdus.service
[root@localhost system]# systemctl start mdus
[root@localhost system]#
```

[Figure 5-3] Apply & execute mdus.service

### 5.3 Create shortcut icon

Create a shortcut to run the software as the end of the installation.

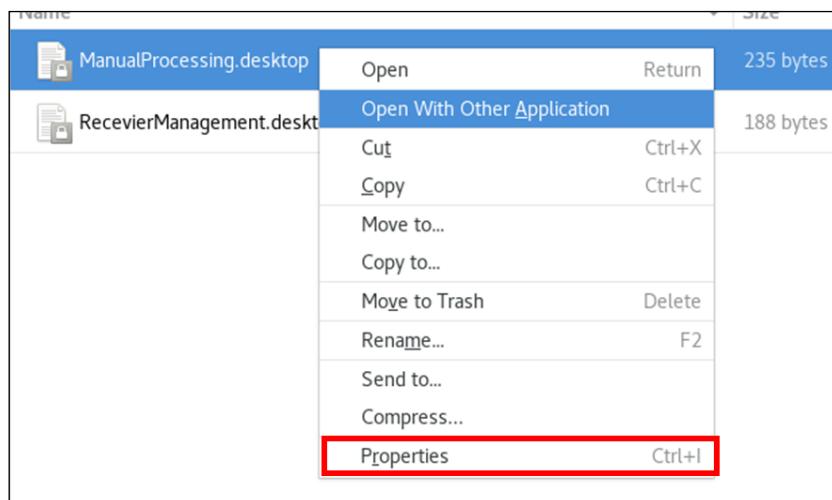
Copy two files in the /home/mdus/gk-2a/install/desktop to desktop.

- Move command : cd /home/mdus/gk-2a/install/desktop/
- Copy command :  
cp ManualProcessing.desktop RecevierManagement.desktop /home/mdus/Desktop/

```
[root@localhost auto_start]# cd /home/mdus/gk-2a/install/desktop/
[root@localhost desktop]# pwd
/home/mdus/gk-2a/install/desktop
[root@localhost desktop]# ls
ManualProcessing.desktop RecevierManagement.desktop
[root@localhost desktop]# cp ManualProcessing.desktop RecevierManagement.desktop /home/mdus/Desktop/
[root@localhost desktop]# cd /home/mdus/Desktop/
[root@localhost Desktop]# pd
bash: pd: command not found...
[root@localhost Desktop]# pwd
/home/mdus/Desktop
[root@localhost Desktop]# ls
ManualProcessing.desktop RecevierManagement.desktop
[root@localhost Desktop]#
```

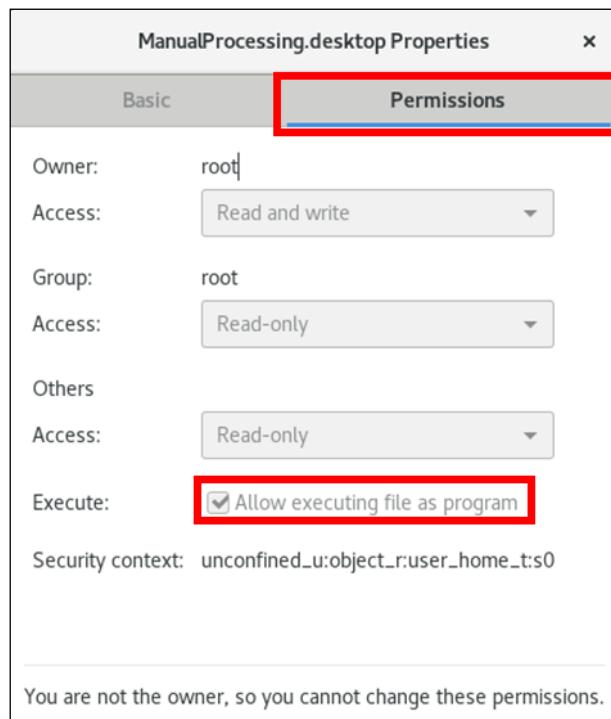
[Figure 5-4] desktop file copy

If user does not see the icon image of the copied executable file, select the file, right-click the mouse and click [Properties].



[Figure 5-5] desktop right-click properties

Check the "Allow Executing file as program" property in the [Permissions] tab of [Properties].



[Figure 5-6] [Permissions] tab of Executable file in the Properties

After the above settings are completed, user can check the icon change by clicking on each file.



[Figure 5-7] Changed GK-2A executable file icon

## 5.4 Execute receiver S/W

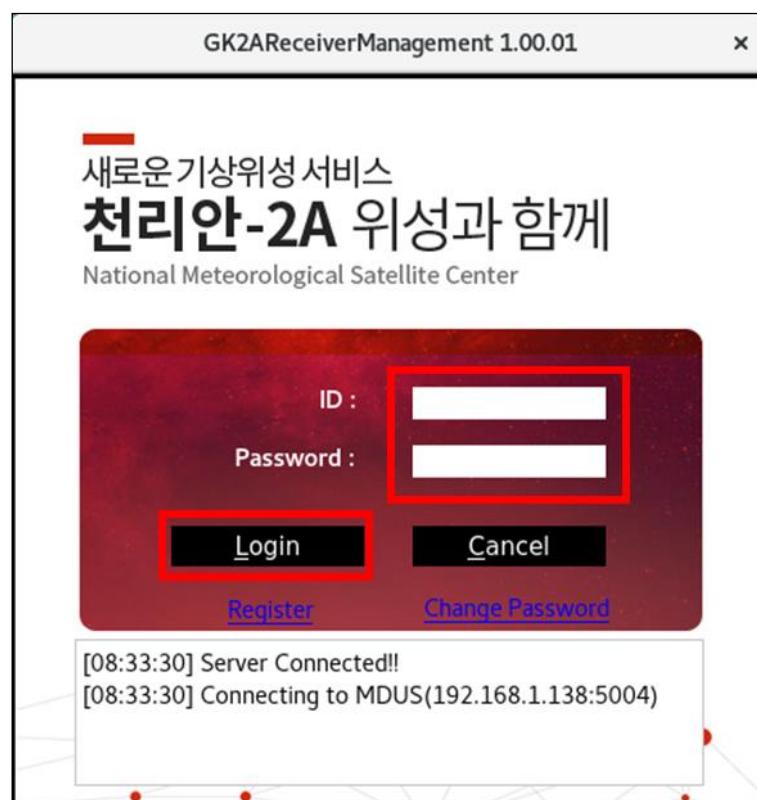
Run GK2A Receiver C & M on the desktop.



[Figure 5-8] GK2A Receiver C&M execution

Enter following ID and Password and log in.

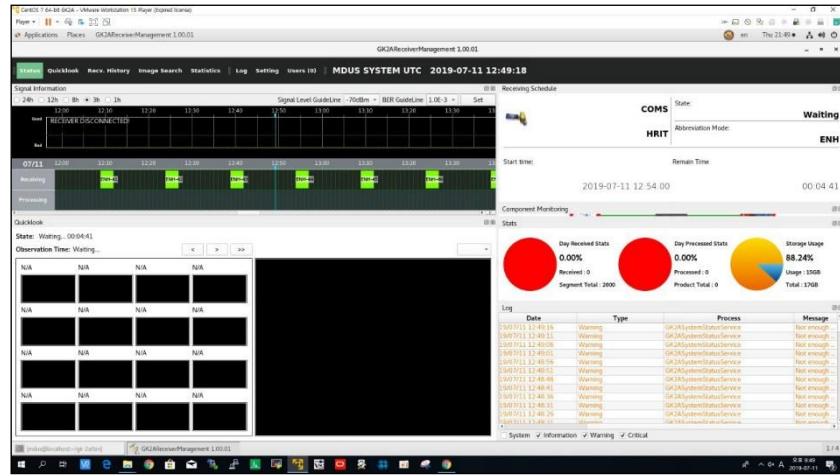
- ID: admin
- Password: qwer!2345



[Figure 5-9] Receiver login window

## GK-2A MDUS Software Install Manual

If user log in successfully as shown in [Figure 5-9], the GK-2A receiving management software (GK2AReceiverManagement) is executed as shown below.



[Figure 5-10] Initial execution of Receiving management S/W

After arranging layouts according to functions, click [Close] button to close the program, and the layout is saved. When the receiving management program is re-executed, the stored layout is applied and executed.