

Module Developers Guide (V 0.5)

For Firmware version 5.00.0x and above

Table of Content

1. Dependency of NAS Firmware version	1
2. Where Module installed.....	1
3. Tree of Module Folder	2
4. install.rdf.....	4
5. install	10
6. upgrade	11
7. uninstall	13
8. enable/disable	14
9. module.rc	15
10. Message of install/uninstall/upgrade	16
11. A reminder for PHP files	17
12. Notice when enable Application Binary	17
13. Backup and Restore for files or database	19
14. Pack the module.....	20

Table of Modification:

Date	Version	Dept.	Author	Note
2011/01/28	0.3	SW1	Enian	
2011/04/18	0.4	SW1	Enian	1. Corrected typo in install.sh, uninstall.sh, and upgrade.sh (ret-> res)
2011/05/10	0.5	SW1	Enian	1. Added 'login' tag in install.rdf 2. Added check_admin 3. Added System Port 4. Added chmod in every Shell Script

Module Developers Guide

1. Dependency of NAS Firmware Version

Currently this module developing document fits the following firmware version. In case some specific Tags need special firmware version, we will describe the conditions separately.

32 bit Firmware	5.00.01 and above
64 bit Firmware	1.00.05 and above

2. Where Module Installed?

- When install or upgrade a module through admin web GUI, the module file “MODULE.mod” will be placed in [/raid/data/tmp](#) first. And then decompressed to [MODULE](#)
- When a module installed to the NAS, the module installation base path will be [/raid/data/module/](#) which is located at the RAID
- The module icon will be put in folder WWW
- The examples of `install.sh` and `upgrade.sh` show how to write the shell scripts
- The corresponding folder name before and after the installation

Before	After
Binary	bin
Driver	drv
Shell	shell
System	sys
WWW	www

Folder/File	Description
Module Folder	The folder contains the source files of the module
Binary	Contains the shell scripts and binary files for user
Configure	Contains the necessary configuration files
install.rdf	Mainly lists the files that must exist while the module install and status display in admin GUI. (PS: must files)
license.txt	module license text file
Driver	Contains the drivers for the module
Shell	Contains the shell scripts of enable.sh, install.sh, uninstall.sh, module.rc, and upgrade.sh
enable.sh	the shell script to enable or disable the module (PS: must file)
install.sh	the shell script to install the module (PS: must file)
uninstall.sh	the shell script to uninstall the module (PS: must file)
module.rc	Defines the actions of the module while NAS reboots, shutdown, service stops, and service starts. (PS: must file)
upgrade.sh	The shell script when the module upgrade to new version. PS: install.sh will run in case the upgrade module doesn't include upgrade.sh
System	Contains the conf or lib that necessary for the module PS: this folder will be backed up to /raid/data/tmp/tmp_backup/module_name while the module upgrades or installs
conf	Contains the Config for the module
backup.list	List the folders or files that should be backup when install.sh runs
upgrade.list	List the files that will be upgraded when upgrade.sh runs
etc	Contains the data files that user needs such as database
include	Contains the header file defined by user
lib	Contains the library defined by user
lang	Contains the message defined by user
en \ de \ es...	Contains the multilingual translations
msg	Message file that defined by user to display something while the module installs
WWW	Contains the UI of the module
Thecus	Thecus certified module PS: must file

4. install.rdf (Format, Table 3)

```
<?xml version="1.0"?>
  <rdf:RDF xmlns:md="http://localhost/module/schema#"
    xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
    xmlns:rdfs="http://www.w3.org/2000/01/rdf-schema#">
    <md:Install>
      <md:ModuleRDF>Install</md:ModuleRDF>
      <md:ModuleRDFVer>1.0.0</md:ModuleRDFVer>
      <md:Name>Hello World</md:Name>
      <md:Version>1.0.00</md:Version>
      <md:Description>My First Module </md:Description>
      <md:Key>Basic</md:Key>
      <md:Authors>My Name</md:Authors>
      <md:Thanks>This Document</md:Thanks>
      <md:WebUrl>http://myweb/index.php</md:WebUrl>
      <md:UpdateUrl>http://update.url/</md:UpdateUrl>
      <md:Reboot>No</md:Reboot>
      <md:Icon>hello.png</md:Icon>
      <md:Mode>User</md:Mode>
      <md:HomePage>index.htm</md:HomePage>
      <md:MacStart>0F:02:00:00</md:MacStart>
      <md:MacEnd>00:00:00:00</md:MacEnd>
      <md:Show>1</md:Show>
      <md:Publish>1</md:Publish>
      <md>Login>1</md>Login>
      <md:UI>User (Thecus)</md:UI>
    </md:Install>
    <md:NAS>
      <md:TargetNas>Thecus</md:TargetNas>
      <md:NasProtol> Model (N7700 N5200 N4100PRO N2200 N0204)</md:NasProtol>
      <md:NasVersion>2.0.00</md:NasVersion>
    </md:NAS>
    <md:DependCom>
      <md:DependName>Module Name1</md: DependName >
      <md:DependVer>Version1</md: DependVer >
      <md: DependUrl>Url1</md: DependUrl >
    </md:DependCom>
    <md:DependCom>
      <md:DependName>Module Name2</md: DependName >
      <md:DependVer>Version2</md: DependVer >
      <md: DependUrl>Url2</md: DependUrl >
    </md:DependCom>
  </rdf:RDF>
```

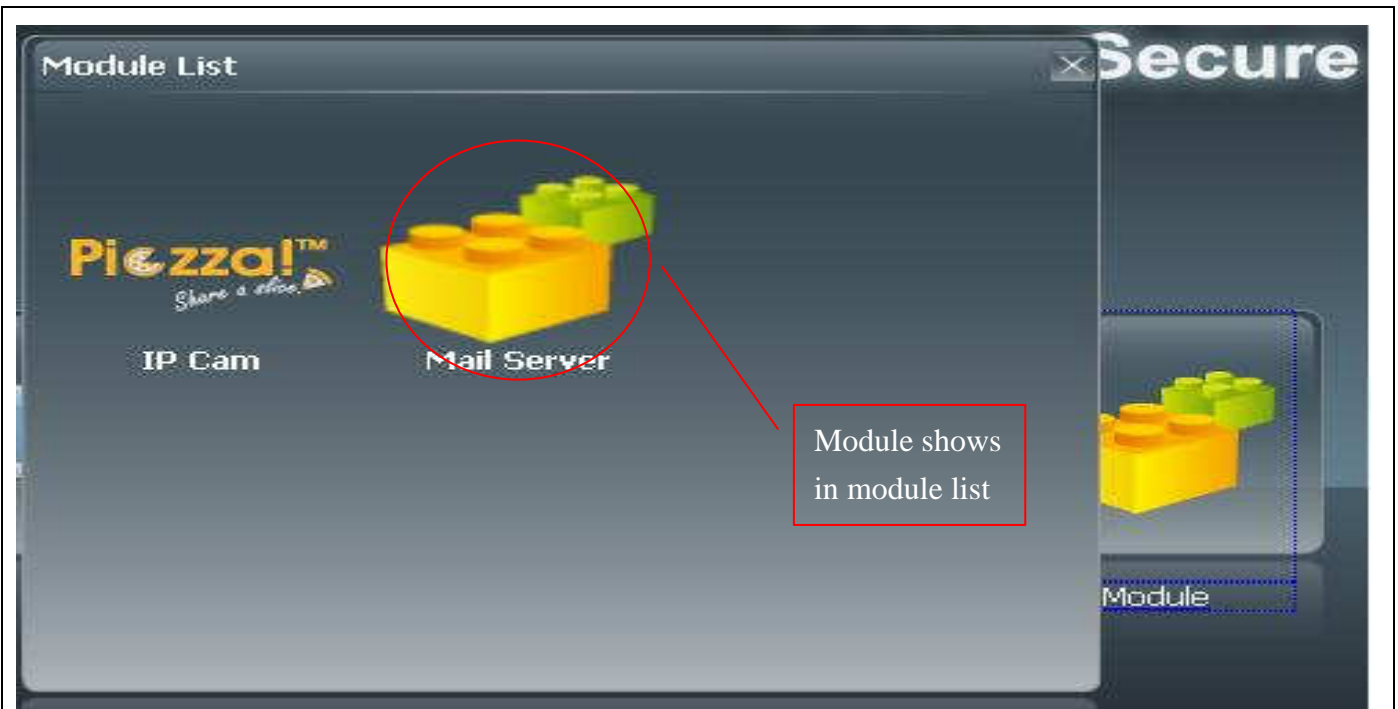
4.1 Major Tag

Tag Name	Description
<code><md:Install>...</md:Install></code>	Information about the module; such as: Module name and Module version
<code><md:NAS>...</md:NAS></code>	Defines the dependency of NAS model and firmware version. It can be added several time when necessary. PS: when this tag not defined, it means this module will fit all NAS models and all firmware versions
<code><md:DependCom>...</md:DependCom></code>	Defines another module that should be installed prior to this one PS: when this tag not defined, it means this module is not dependent to any other module

4.2 <md:Install>

All the tags in <md:Install> should follow the format in table 3. No any change will be allowed

Tag Name	Description				
<md:ModuleRDF>	Content: <md:ModuleRDF> Install </md:ModuleRDF>				
<md:ModuleRDFVer>	The version of rdf (should be x.x.x such as 1.0.1) to check if it matches the firmware version of NAS PS: it will be 1.0.0 to fit NAS FW v5				
<md:Name>	Module Name				
<md:Version>	Module Version (Format: x.x.x such as 1.0.1)				
<md:Description>	Module Description				
<md:Key>	The ID of the module and it is also the folder name when it installed to the NAS. When two modules have the same tag value, the NAS system will treat them as the same. This tag value allows a-z, A-Z, 0-9, and _. PS: this tag vaule should match the module_name in install.sh, uninstall.sh, and upgrade.sh. Otherwise, the module will not be installed or cause troubles.				
<md:Authors>	Module Authors				
<md:Thanks>	Lists the acknowledgement, the copy right, or references				
<md:WebUrl>	Lists the website URL about the author				
<md:Reboot>	Define if the NAS should reboot when the module enabled or disabled (No/Yes)				
<md:Icon>	Indicate the file name of module icon. If not defined, there will be default one. Icon file is under www/				
<md:Mode>	Define if this is user module or system module (User/System)				
<md:HomePage>	The home page file of the module UI. It just works when <md:UI> is User; and the default value is index.htm				
<md:NasMacStart>	Define the lower limit of MAC address of the NAS. Empty value means this module is not MAC address dependent.				
<md:NasMacEnd>	Define the higher limit of MAC address of the NAS. Empty value means this module is not MAC address dependent.				
<md>Show>	Defines if this module will be listed on Module List page in NAS homepage 1: listed on Module list page 0: hidden from Module list page <table border="1" data-bbox="475 1910 1262 2004"> <tbody> <tr> <td>32 bit Firmware</td> <td>5.02.01 and above</td> </tr> <tr> <td>64 bit Firmware</td> <td>2.02.01 and above</td> </tr> </tbody> </table>	32 bit Firmware	5.02.01 and above	64 bit Firmware	2.02.01 and above
32 bit Firmware	5.02.01 and above				
64 bit Firmware	2.02.01 and above				



<md:Publish>

Define if there will be a checkbox in the module's 'Show in Login' column in admin UI

1: Enable the checkbox in 'Show in Login'

0: No checkbox in 'Show in Login'

32 bit Firmware	5.02.01 and above
64 bit Firmware	2.02.01 and above

Module Management

Enable	Type	Name	Version	Description	Last Status	Action	Show in Login
No	System	DLM2	1.0.19	Download Manag			
No	System	Usb/eSATA Backup	1.0.2	USB/eSATA Schi			
Yes	System	IP Cam	3.0.0	IP Cam			
No	System	Piczza	1.0.1	description			
Yes	User	Mail Server	2.0.0	Mail Server			<input checked="" type="checkbox"/>

Callout box: Show this check box (pointing to the checked checkbox in the 'Show in Login' column for 'Mail Server')

<md:Login>

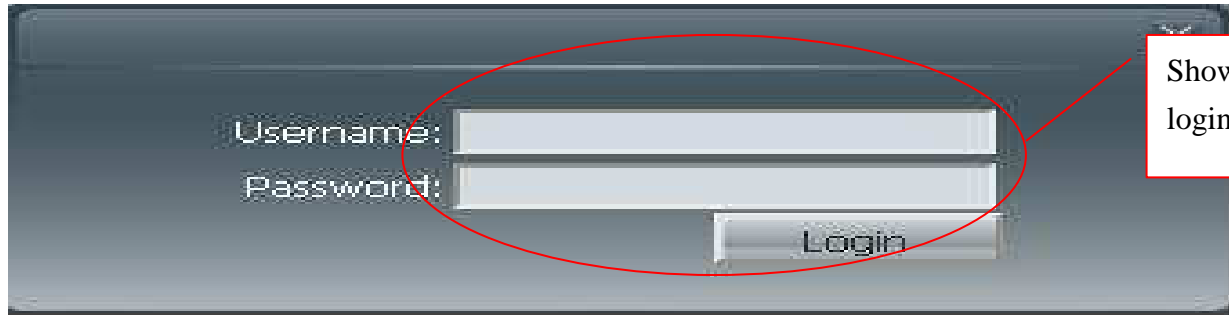
Define if the module authentication will follow the NAS login mechanism while entering the module via the Module List in NAS homepage.

1: Follow the NAS Login mechanism

0: Do not follow the NAS Login mechanism

32 bit Firmware	5.02.01 and above
64 bit Firmware	2.02.01 and above

PS: while this tag is 1, refer to chapter 11 for the reminders of PHP file.



<md:UI>

Define if it is an User or Thecus module for the behavior of Module UI
 PS: It should be the last tag as what Table 3 shows

4.3 <md:NAS>

Tag Name	Description										
< md:TargetNas >	Define the NAS manufacture (Thecus)										
<md: NasProtol >	<p>Define the model type that fit this module; such as N7700, N4100PRO, N16000 and/or N12000.</p> <p>PS: when NasVersion is defined but missing NasProtol, the value of NasVersion will be invalid.</p> <p>The value of NasProtol for Thecus NAS</p> <table border="1"> <thead> <tr> <th>Thecus NAS Product</th> <th>NasProtol</th> </tr> </thead> <tbody> <tr> <td>N5500/1U4600/ N7700/N7700SAS/N7700PRO/N7700Plus/ N8800/N880SAS/N8800PRON8800PLUS/ N4200/N4200ECO/N4200PRO/ 1U4200XXX/N5200XXX/N8200XXX/ N2200XXX/N3200XXX/N0503</td> <td>N7700</td> </tr> <tr> <td>N4100PRO</td> <td>N4100PRO</td> </tr> <tr> <td>N16000</td> <td>N16000</td> </tr> <tr> <td>N12000</td> <td>N12000</td> </tr> </tbody> </table>	Thecus NAS Product	NasProtol	N5500/1U4600/ N7700/N7700SAS/N7700PRO/N7700Plus/ N8800/N880SAS/N8800PRON8800PLUS/ N4200/N4200ECO/N4200PRO/ 1U4200XXX/N5200XXX/N8200XXX/ N2200XXX/N3200XXX/N0503	N7700	N4100PRO	N4100PRO	N16000	N16000	N12000	N12000
Thecus NAS Product	NasProtol										
N5500/1U4600/ N7700/N7700SAS/N7700PRO/N7700Plus/ N8800/N880SAS/N8800PRON8800PLUS/ N4200/N4200ECO/N4200PRO/ 1U4200XXX/N5200XXX/N8200XXX/ N2200XXX/N3200XXX/N0503	N7700										
N4100PRO	N4100PRO										
N16000	N16000										
N12000	N12000										
<md: NasVersion >	<p>Defines the minimum FW version that required to install this module</p> <p>Format: x.xx.xx</p>										

4.4 <md: DependCom>

Tag Name	Description
<md:DependName>	Module Name of another module that should be

	<p>installed prior to this one (case sensitive). Skipping this tag means no need to check.</p> <p>PS: When DependVer is defined but missing DependName, the former will be invalid.</p>
<md:DependVer>	<p>The version of another module that should be installed prior to this one. Skipping this tag means no need to check.</p>
<md: DependUrl>	<p>Information or download link about the dependent module</p>

5. install

An example of install.sh

```
#!/bin/sh
res='fail'

module_name='Basic'

mkdir "/raid/data/module/cfg/" > /dev/null 2>&1
mkdir "/raid/data/module/cfg/module.rc/" > /dev/null 2>&1
mkdir "/raid/data/module/$module_name/" > /dev/null 2>&1
mkdir "/raid/data/module/$module_name/bin/" > /dev/null 2>&1
mkdir "/raid/data/module/$module_name/shell/" > /dev/null 2>&1
mkdir "/raid/data/module/$module_name/sys/" > /dev/null 2>&1
mkdir "/raid/data/module/$module_name/www/" > /dev/null 2>&1
mkdir "/raid/data/module/$module_name/drv/" > /dev/null 2>&1
cp -f /raid/data/tmp/module/Shell/module.rc "/raid/data/module/cfg/module.rc/$module_name.rc" >/dev/null
2>&1
cp -rf /raid/data/tmp/module/Binary/* "/raid/data/module/$module_name/bin" > /dev/null 2>&1
cp -rf /raid/data/tmp/module/Shell/* "/raid/data/module/$module_name/shell" > /dev/null 2>&1
cp -rf /raid/data/tmp/module/System/* "/raid/data/module/$module_name/sys" > /dev/null 2>&1
cp -rf /raid/data/tmp/module/WWW/* "/raid/data/module/$module_name/www" > /dev/null 2>&1
cp -rf /raid/data/tmp/module/Driver/* "/raid/data/module/$module_name/drv" > dev/null 2>&1
cp -f /raid/data/tmp/module/Configure/license.txt "/raid/data/module/$module_name/COPY"> /dev/null
2>&1
res='pass'
echo $res
```

5.1. The value of `module_name` should be the same with `Module Folder Name` and `<md:Key>`

Ex.:

`module_name='Basic'` (means `<md:Key>Basic</md:Key>`, and `Module Folder Name = Basic`)

5.2. The last line `echo $res` should not be omitted; otherwise, the NAS system will not know if the module is installed correctly or not.

5.3. Change the `install.sh` to be executable. (`chmod 755 install.sh`)

6. upgrade

An example of upgrade.sh

```
#!/bin/sh
res='fail'
module_name='Basic'
upgrade_list='/raid/data/tmp/module/System/conf/upgrade.list'
cat "${upgrade_list}" | \
while read list
do
  if [ "${list}" != "" ];then
    source=`echo "${list}" | awk -F',' '{print $1}'`
    target=`echo "${list}" | awk -F',' '{print $2}'`
    deep_path=`echo "${target}" | awk -F'\/' '{print NF}'`
    last_name_len=`echo "${target}" | awk -F'\/' '{print length($NF)}'`
    last_value=`echo "${target}" | awk '{print substr($0,length($0))}'`
    if [ "$deep_path" != "1" ];then
      if [ "${last_value}" != "/" ];then
        str="echo '${target}' | awk '{print substr(\$0,1,length(\$0)-$last_name_len)}'"
      else
        str="echo '${target}' | awk '{print \$0}'"
      fi
      folder_path=`eval "$str"`
      if [ ! -e "${target_folder}/${folder_path}" ];then
        mkdir -p "${target_folder}/${folder_path}"
      fi
    fi
    cp -rf /raid/data/tmp/module/${source} /raid/data/module/${module_name}/${target} >
/dev/null 2>&1
  fi
done
res='pass'
echo $res
```

6.1. The value of `module_name` should be the same with `Module Folder Name` and `<md:Key>`

Ex.:

`module_name='Basic'` (means `<md:Key>Basic</md:Key>`, and `Module Folder Name = Basic`)

6.2. The last line `echo $res` should not be omitted; otherwise, the NAS system will not know if the module is upgraded correctly or not.

6.3. Change the upgrade.sh to be executable. (chmod 755 upgrade.sh)

6.4. `upgrade_list="/raid/data/tmp/module/System/conf/upgrade.list"` It defines the upgrade list file.

6.5. `upgrade.list` is a must file when upgrade the module. It is located under `System/con`:

6.5.1 Syntax

Source file,Target file

6.5.2 Example

```
WWW/*,www/  
Shell/*,shell/  
Binary/*,bin/  
Driver/*,drv/  
System/conf/*,sys/conf/  
System/lang/*,sys/lang/  
System/include/*,sys/include/  
System/lib/*,sys/lib/  
System/lib/*,sys/var/
```

Above example means

Copy all files and subfolders from WWW to www

Copy all files and subfolders from Shell to shell

Copy all files and subfolders from Driver to drv

Copy all files and subfolders from System/conf to sys/conf

Copy all files and subfolders from System/lang to sys/lang

Copy all files and subfolders from System/include to sys/include

Copy all files and subfolders from System/lib to sys/lib

Copy all files and subfolders from System/var to sys/var

7. uninstall

An example of `uninstall.sh`

```
#!/bin/sh
res='fail'
module_name=$1
/raid/data/module/cfg/module.rc/"$mod_name.rc" stop
rm -rf "/raid/data/module/cfg/module.rc/$module_name.rc"
rm -rf "/raid/data/module/$module_name"
rm -f "/img/htdocs/module/$module_name"
res='pass'
echo $res
```

- 7.1. `module_name=$1` means the first external parameter
- 7.2. The last line `echo $res` should not be omitted; otherwise, the NAS system will not know if the module is uninstalled correctly or not.
- 7.3. Change the `uninstall.sh` to be executable. (`chmod 755 uninstall.sh`)

8. enable/disable

An example of enable.sh

```
#!/bin/sh
res='fail'
module_name=$1
module_enable=$2
if [ "${module_enable}" == "No" ];then
    /raid/data/module/cfg/module.rc/"$module_name.rc" start "${module_name}"
    if [ $? -eq 0 ];then
        res='pass'
    fi
elif [ "${module_enable}" == "Yes" ];then
    /raid/data/module/cfg/module.rc/"$module_name.rc" stop "${module_name}"
    if [ $? -eq 0 ];then
        res='pass'
    fi
fi
echo $res
```

- 8.1. `module_name=$1` means the first external parameter
- 8.2. `module_enable=$2` means the second external parameter
- 8.3. The last line `echo $res` should not be omitted; otherwise, the NAS system will not know if the module is uninstalled correctly or not.
- 8.4. `/raid/data/module/cfg/module.rc/"$module_name.rc" start "${module_name}"` means start the module by module.rc
- 8.5. `/raid/data/module/cfg/module.rc/"$module_name.rc" stop "${module_name}"` means stop the module by module.rc
- 8.6. Change the enable.sh to be executable. (`chmod 755 enable.sh`)

9. module.rc

```
#!/bin/sh
# Startup script for Module
# Some definitions.
RETVAl=0
#Function
module_name=$2
start() {
    $RETVAl=0
    return $RETVAl
}
stop() {
    RETVAl=0
    return $RETVAl
}
boot() {
    /bin/rm -f /raid/data/module/${mod_mame}/sys/status/*
    $RETVAl=0
    return $RETVAl
}
# See how we were called.
case "$1" in
start)
    start
    ;;
stop)
    stop
    ;;
boot)
    boot
    ;;
restart)
    stop
    start
    ;;
*)
    echo $"Usage: $prog {start module_name |stop module_name |restart module_name |boot module_name }"
    exit 1
esac

exit $RETVAl
```

9.1. **\$1** means the **action** to be run; such as start, stop, or boot

9.2. **\$2** means **module_name**

9.3. Change the module.rc to be executable. (chmod 755 module.rc)

10. Message for install/uninstall/upgrade

10.1 The log file of messages

```
/var/tmp/tmp_module/tmp_module_log.txt
```

10.2 Log message in the Shell Script

```
echo "msg" >> "/var/tmp/tmp_module/tmp_module_log.txt"
```

10.3 Example:

To show [copy Binary folder now](#) while the module installing

```
#!/bin/sh
res='fail'

module_name='Basic'
mkdir "/raid/data/module/cfg/" > /dev/null 2>&1
mkdir "/raid/data/module/cfg/module.rc/" > /dev/null 2>&1
mkdir "/raid/data/module/$module_name/" > /dev/null 2>&1
mkdir "/raid/data/module/$module_name/bin/" > /dev/null 2>&1
mkdir "/raid/data/module/$module_name/shell/" > /dev/null 2>&1
mkdir "/raid/data/module/$module_name/sys/" > /dev/null 2>&1
mkdir "/raid/data/module/$module_name/www/" > /dev/null 2>&1
mkdir "/raid/data/module/$module_name/drv/" > /dev/null 2>&1
cp -f /raid/data/tmp/module/Shell/module.rc "/raid/data/module/cfg/module.rc/$module_name.rc" >/dev/null 2>&1
echo "copy Binary folder now" >> /var/tmp/tmp_module/tmp_module_log.txt
cp -rf /raid/data/tmp/module/Binary/* "/raid/data/module/$module_name/bin" > /dev/null 2>&1
cp -rf /raid/data/tmp/module/Shell/* "/raid/data/module/$module_name/shell" > /dev/null 2>&1
cp -rf /raid/data/tmp/module/System/* "/raid/data/module/$module_name/sys" > /dev/null 2>&1
cp -rf /raid/data/tmp/module/WWW/* "/raid/data/module/$module_name/www" > /dev/null 2>&1
cp -rf /raid/data/tmp/module/Driver/* "/raid/data/module/$module_name/drv" > dev/null 2>&1
cp -f /raid/data/tmp/module/Configure/license.txt "/raid/data/module/$module_name/COPY"> /dev/null 2>&1
res='pass'
echo $res
```

11. A reminder for PHP files

When ModuleLogin tag is 1 in install.rdf, <md:Login>1</md:Login>, add the following codes at the beginning of every PHP file in the module. *If the modules web pages do not implement a protection on their own the below checks should always be implemented to prevent unauthorized direct access.*

```
<? session_start();
    require_once("/img/www/inc/security_check.php");
    check_admin($_SESSION);
    .....
    .....
?>
```

12. Notice when enable Application Binary

12.1 System Ports

When the module needs to use TCP/UDP ports, make sure there will not be any conflict with system reserved or using service ports.

12.1.1 System TCP Ports

Service	TCP Port
iTunes	3689
iSCSI	3260
afp	548
media	8080
twonky(UI)	9000/9001
nfsd	111/2049
nsync	2000
rsync	873
printer	631
mysql	3306
mail server	995/25
upnp	2689
DLM2(BT)	10000~10200
DLM2(amule)	4662
DHCP	67/68
SNMP	161/162

ftp	20/21
Apache module	10080
samba	139/445
ssh	22
http	80
https	443
WebDisk	1080
Rsync ssh	23
Nut Service	3305

12.1.2 System UDP Ports

Service	UDP Port
iTunes	5353
nfsd	111/2049
printer	631
mysql	3306
twonky	1900/1030
upnp	1900
samba	138/137
ntp	123
udpr	11000/11001
DHCP	67/68
SNMP	161/162
syslog	514
tftp	69
ftp	20/21
DLM2(amule)	4672
WebDisk	1080
Nut Service	3305

13. Backup and Restore for Files or Database

13.1 Backup

The module folder is located at `/raid/data/module/` after the installation. So, you will need to do a backup copy while install the module again or upgrade it to newer version. To do it, put the commands in the beginning of `install.sh` to copy the files or database to `/raid/data/tmp/module/folder`. And then do `mkdir` and `cp`.

13.2 Restore

When the module (say, Basic) installing or upgrading, the NAS firmware will backup the `sys` folder (Basic/sys) to `/raid/data/tmp/tmp_backup/module_name/` (`/raid/data/tmp/tmp_backup/Basic/`). So when necessary, you can restore the module `sys` from old copy.

13.3 Example

1. Backup `sys/etc/basic.db` to `tmp/module/System/etc/basic.db` when the module installing
2. if something wrong, restore the files from the backup

```
#!/bin/sh
res='fail'
error="0"
module_name='Basic'
cp /raid/data/module/${module_name}/sys/etc/basic.db /raid/data/tmp/module/System/etc/basic.db
mkdir "/raid/data/module/cfg/" > /dev/null 2>&1
mkdir "/raid/data/module/cfg/module.rc/" > /dev/null 2>&1
mkdir "/raid/data/module/${module_name}/" > /dev/null 2>&1
.
.
if [{"error}" == "1" ];then
    cp -rd /raid/data/tmp/tmp_backup/${module_name}/sys/* /raid/data/module/${module_name}/sys/
    exit
fi
ret='pass'
```

14. Pack the module

Pack the module by tar: `tar zcfp module_file.mod module_folder`. The following sample shows how to pack `Basic.mod`.

```
root@THECUS-FWv5:~#  
root@THECUS-FWv5:~#  
root@THECUS-FWv5:~#  
root@THECUS-FWv5:~#  
root@THECUS-FWv5:~# ls  
Basic  
root@THECUS-FWv5:~# tar zcfp Basic.mod ./Basic  
root@THECUS-FWv5:~# ls  
Basic Basic.mod  
root@THECUS-FWv5:~#
```