LynxOS-178 Release Notes

LynxOS-178

DOC-2200-00

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Preface

Typographical Conventions

The typefaces used in this manual, summarized below, emphasize important concepts. All references to filenames and commands are case-sensitive and should be typed accurately.

Kind of Text	Examples
Body text; *italicized* for emphasis, new terms, and book titles	Refer to the *LynxOS-178 User's Guide*
Environment variables, filenames, functions, methods, options, parameter names, path names, commands, and computer data	`ls -l myprog.c /dev/null`
Commands that need to be highlighted within body text or commands that must be typed as is by the user are **bolded**.	`login:` **`myname`** `#` **`cd /usr/home`**
Text that represents a variable, such as a filename or a value that must be entered by the user, is *italicized*.	`cat` *`<filename>`* `mv` *`<file1> <file2>`*

Blocks of text that appear on the display screen after entering instructions or command	`Loading file /tftpboot/shell.kdi into 0x4000`
	`.....`
	`File loaded. Size is 1314816`
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Keyboard options, button names, and menu sequences	**`Enter`**, **`Ctrl-C`**

Technical Support

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http://www.lynx.com/training-support/contact-support/

How to Submit a Support Request

When you are ready to submit a support request, please include *all* of the following information:

- First name, last name, your job title
- Phone number, e-mail address
- Company name, address
- Product version number
- Target platform (for example, PowerPC)
- Board Support Package (BSP), Current Service Pack Revision, Development Host OS version
- Detailed description of the problem that you are experiencing:
- Is there a requirement for a US Citizen or Green Card holder to work on this issue?
- Priority of the problem - Critical, High, Medium, or Low?

Where to Submit a Support Request

Support, Europe	tech_europe@lynx.com +33 1 30 85 93 96
Support, worldwide except Europe	support@lynx.com +1 800-327-5969 or +1 408-979-3940 +81 33 449 3131 [for Japan]
Training and Courses	USA: training-usa@lynx.com Europe: training-europe@lynx.com USA: +1 408-979-4353 Europe: +33 1 30 85 06 00

LynxOS-178 Documentation Set

The LynxOS-178 Documentation Set includes the following:

- *LynxOS-178 Installation Guide*
- *LynxOS-178 User's Guide*
- *LynxOS-178 ARINC 653 Conformance Document*
- *LynxOS-178 ARINC 653 Migration Guide*
- *LynxOS-178 POSIX Conformance Document*
- *LynxOS-178 FACE Conformance Document*
- *LynxOS-178 FACE Conformance Verification Matrix*
- *LynxOS-178 Device Driver Writer's Guide*
- *LynxOS-178 Health Monitor Application Writer's Guide*
- *LynxOS-178 Advanced Porting Kit Guide for ARM*
- *LynxOS-178 ZCU102 Board Support Guide*
- *LynxOS-178 ZC702 Board Support Guide*
- *LynxOS-178 Lynx Certifiable Stack User's Guide*
- *Luminosity User's Guide*
- *FLEXLM License Manager documentation*

CHAPTER 1 Overview

Introduction

These release notes provide information about the following:

- New Features
- Supported Cross-Development Configurations
- Supported Board Support Packages
- Changes to existing features
- Obsolescent features, files and directories
- Development host requirements
- LCS Features
- Known Issues and Limitations

New Features

The following new features are included in this release:

- Support for the Supermicro X10SDV-TLN4F target
- Support for the Xtreme Engineering 7674 target
- Support for the Xilinx Zynq Ultrascale+ MPSoc ZCU102 target
- Support for the Xilinx Zynq 7000 Cortex A9 ZC702 target
- Changes to accommodate time beyond the year 2038
- Updated GCC 7.1 tool chains that support armv7 core and x86
- USB 3.0 support
- Support for the `lsk_fifo` driver (the `zcu102` and `x86_pv` BSPs)
- Luminosity based on Eclipse version 4.7.0 IDE and CDT version 9.3.0 which contains the support for new target boards mentioned in this document
- This release is compatible with Lynx Certifiable Stack (LCS) version 2.2.0

Supported Cross-Development Configurations

A Cross-Development Environment consists of a Cross-Development Host running on a platform that is different from the intended target board. LynxOS-178 applications are developed with the LynxOS-178 Cross-Development Kit (CDK) on the Cross-Development Host and then downloaded onto the target board.

The following Cross-Development Environments are supported:

- Microsoft Windows:
  - Windows 7 Professional, SP1 (64-bit)
  - Windows 10 Professional (64-bit)
- Linux Workstations:
  - CentOS 7.2 (64-bit)
  - CentOS 7.3 (64-bit)
  - CentOS 7.4 (64-bit)
  - CentOS 7.5 (64-bit)

  Note: Other newer compatible versions may also work. However, they have not been tested

Supported Board Support Packages

The following table describes the supported Board Support Packages (BSPs) for this release.

Table 1-1: Supported BSPs

BSP Name	Boards Supported
`x86_pv`	Supermicro X10SDV-TLN4F, XES 7674 Boards
`zcu102`	Xilinx Zynq Ultrascale+ MPSoc ZCU102 Evaluation Board
`zc702`	Xilinx Zynq 7000 Cortex A9 ZC702 Evaluation Board

Changes to Existing Features

The following features are improved in this release:

- Support for binaries without BSS or data sections is added.
- Dynamic drivers are automatically installed to the `/sys/dldd` directory.
- Disk IO reading performance is increased due to block cache optimization.
- The rs232 driver is updated to require a single serial port.
- System call numbering is changed. Currently, system calls do not have pre-defined numbers. Numbers are assigned automatically according to the order of the system call entries in the `sys/syscalls/syscall.master` file. The resultant system call numbers are located in the `usr/include/machine/syscall_nums_arm.h` header which is automatically included from `usr/include/syscall_nums.h`.
- An ability to boot LynxOS-178 without configured serial port on the zcu102 and x86_pv targets is added.
- ARINC653 Enhancements:
  - ARINC 653 support has been modified to better follow the ARINC standard. See the ARINC 653 Migration Guide for details.
  - `WAIT_FOR_NORMAL_MODE()` has been removed.
  - `arinc653_module_channel_ports_allocate()` has been updated to verify given port values.
- POSIX Enhancements:
  - POSIX support has been updated to better conform to the POSIX.1-2008 version of the standard.
  - Support for `clock_nanosleep()` has been added.
  - Support for `posix_spawnp()` and `posix_spawn_file_actions_destroy()` has been added.
  - Support for the `SA_RESETHAND` flag in `sigaction()` API has been added.
  - Now multiple pending unblocked realtime signals are delivered to user applications in order from the lowest numbered signal to the highest numbered signal.
- FACE Support:
  - The following HMFM Services APIs have been added:

Table 1-2: Added HMFM Services APIs

Function Name
`Initialize()`
`Create_Fault_Handler()`
`Report_Application_Message()`
`Get_Fault_Status()`
`Raise_Application_Fault()`

The following functions previously available in production mode have been made available in development mode only:

Table 1-3: Functions Removed from Production Mode

Function Name
closelog()
openlog()
syslog()
fpathconf()
fputc()
fputs()
getchar()
gets()
putchar()
puts()
mkstemp()
getprotobynumber()
getprotoent()
popen()
popenr()()
pthread_mutex_getprioceiling()
pthread_mutexattr_settype()
setregid()
strcasecmp()
strcasecmp()
strncasecmp()
strncasecmp()
writev()
posix_spawn()
posix_spawnattr_destroy()
posix_spawnattr_getflags()
posix_spawnattr_getpgroup()
posix_spawnattr_getschedparam()
posix_spawnattr_getschedpolicy()
posix_spawnattr_getsigdefault()
posix_spawnattr_getsigmask()
posix_spawnattr_init()()
posix_spawnattr_setflags()
posix_spawnattr_setpgroup()
posix_spawnattr_setschedparam()
posix_spawnattr_setschedpolicy()
posix_spawnattr_setsigdefault()

Table 1-3: Functions Removed from Production Mode (Continued)

Function Name
posix_spawnattr_setsigmask()
posix_spawn_file_actions_addclose()
posix_spawn_file_actions_adddup2()
posix_spawn_file_actions_addopen()
posix_spawn_file_actions_init()

New Directories

There are the following new directories in this release:

Table 1-4: New Directories

Directory Name
/sys/dldd
/sys/family
/sys/family/arm
/sys/family/x86

Deprecated Items

The following features, files, and directories are deprecated:

- The -mthreads linker flag used to link with the multi-threaded libraries is no longer needed as all multi-threaded libraries are located in the default /lib directory.
- The libsyscalls.a library is removed. The system call related object files are part of the libfamily_<arch>.a library (where <arch> is arm or x86).
- Content of the /sys/family.<arch> directory is moved to the /sys/family/<arch> directory (where <arch> is arm or x86).
- Single-threaded libraries are not supported, the /lib directory currently contains multi-threaded versions of all libraries. The /lib/thread directory is removed.
- All device driver files (cfg, header, info, and driver source) are collocated in a single directory for each device driver. As a result, the /sys/dheaders and /sys/devices directories are obsoleted. In addition, the device info files are moved to the driver library (libdrivers.a) and the device library (libdevices.a) is removed.

Table 1-5: Deprecated Files and Directories

File or Directory Name
/lib/thread
/sys/dheaders
/sys/devices
/sys/family.arm
/sys/family.x86
/sys/lib/libdevices.a
/sys/lib/libsyscalls.a

- The following files were initially created to allow source code to compile even if it did not use the correct paths to include POSIX header files. POSIX applications should be modified to use the correct paths when including POSIX header files. The following header files are removed:

Table 1-6: Deprecated Header Files

File Name
/usr/include/sys/aio.h
/usr/include/sys/assert.h
/usr/include/sys/ctype.h
/usr/include/sys/dirent.h
/usr/include/sys/errno.h
/usr/include/sys/fcntl.h
/usr/include/sys/float.h
/usr/include/sys/ftw.h
/usr/include/sys/grp.h
/usr/include/sys/limits.h
/usr/include/sys/locale.h
/usr/include/sys/math.h
/usr/include/sys/mqueue.h
/usr/include/sys/netdb.h
/usr/include/sys/poll.h
/usr/include/sys/pthread.h
/usr/include/sys/pwd.h
/usr/include/sys/sched.h
/usr/include/sys/search.h
/usr/include/sys/semaphore.h
/usr/include/sys/setjmp.h
/usr/include/sys/signal.h
/usr/include/sys/stdarg.h
/usr/include/sys/stddef.h
/usr/include/sys/stdio.h
/usr/include/sys/stdlib.h
/usr/include/sys/string.h
/usr/include/sys/strings.h
/usr/include/sys/stropts.h
/usr/include/ipc.h
/usr/include/mman.h
/usr/include/msg.h
/usr/include/resource.h
/usr/include/select.h
/usr/include/sem.h
/usr/include/shm.h
/usr/include/socket.h
/usr/include/stat.h
/usr/include/times.h

Table 1-6: Deprecated Header Files (Continued)

File Name
/usr/include/types.h
/usr/include/uio.h
/usr/include/un.h
/usr/include/utsname.h
/usr/include/wait.h
/usr/include/sys/syslog.h
/usr/include/sys/tar.h
/usr/include/sys/termios.h
/usr/include/sys/unistd.h
/usr/include/sys/utime.h

Development Host Requirements

The following system requirements are recommended for the host development system:

- X86 64-bit machine running CentOS 7.2 (1511) or later (7.3-7.5)
- X86 64-bit machine running Windows 7 Professional SP1 or Windows 10 Professional
- Standard set of GNU/ Linux Utilities (the bash shell must be used on the cross development host)
- At least 4GB RAM
- At least 5GB free disk space for the binary product installation
- At least 2GB free disk space for the source product installation

LCS Features

This release of LCS provides the following features:

- Awareness of the LynxOS-178 partitioning. Several partitions in the system can use the LCS TCP/IP stack simultaneously without affecting each other.
- Development and production modes support.
- Support up to 8 interfaces (including loopback) per VM.
- Supported drivers for the following Networking Controllers:
  - ZCU102 GEM
  - ZC702 GEM
  - The loopback pseudo device.
  - Inter-partition communications.
- Compatibility with standard network features:
  - `ftp` and `ftpd`
  - `tftp` and `tftpd`
  - ntpd
  - net-snmp
  - `rshd` and `rlogind`
  - arp
  - `ifconfig`, `route`, `tcpdump`/`libpcap`, and `ping`
- The following protocols are certifiable to DO-178C Level A:
  - IPv4
  - ICMP
  - ARP
  - UDP (limited support)
- The following socket options are supported:
  - `SO_SNDBUF`
  - `SO_RCVBUF`
  - `SO_TYPE`
  - `SO_ERROR`
- The following protocols are certifiable to DO-178C Level B:
  - IPv4
  - ICMP
  - ARP
  - UDP
  - TCP
  - IGMP

- The following socket options are supported:
  - SO_SNDBUF
  - SO_RCVBUF
  - SO_TYPE
  - SO_ERROR
  - IP_TOS
  - IP_MULTICAST_IF
  - IP_MULTICAST_TTL
  - IP_MULTICAST_LOOP
  - IP_ADD_MEMBERSHIP
  - IP_DROP_MEMBERSHIP
  - SO_BROADCAST
  - SO_LINGER
- The PF_INET protocol family for the SOCK_RAW, SOCK_DGRAM, and SOCK_STREAM socket types
- The PF_ROUTE protocol family for the SOCK_RAW socket types
- Configurable TCP/IP stack parameters
- Static and dynamic ARP
- Support of routing (except packet forwarding)

CHAPTER 2 Known Issues and Limitations

General Limitations

- The USB driver supports only Mass Storage and Hub device classes in this release.
- The `readdir()` function does not support detection of an invalid directory stream pointer argument. Calling `readdir()` with an uninitialized DIR `*dirp` pointer, or with a released pointer due to a previous call to `closedir()`, may result in unpredictable results. The applications must ensure that the `dirp` argument passed to `readdir()` is valid and properly initialized. However, it must be noted that the current version of the POSIX.1 standard does not require that the `readdir()` function detect such a condition, and lists the `EBADF` error code as optional.
- The `pthread_mutexattr_setpshared()` and `pthread_condattr_setpshared()` APIs do not provide intended functionality. A request for `PTHREAD_PROCESS_PRIVATE` is silently ignored and functionality equivalent to `PTHREAD_PROCESS_SHARED`is always enforced by default or otherwise.

Open Software Issues

- High speed data traffic between a LynxOS-178 x86 guest and the Virtual Device Server (VDS) should be limited to configurations where ssh is used to connect from the host to the VDS rather than using a physical serial port.
  When using the paravirtual UART (pvuart) driver to communicate with the VDS which has a physical serial port assigned to it, it is possible to lose data if the data transmission rate from the LynxOS-178 guest to the VDS exceeds the speed at which the VDS is able to transmit the data over the physical serial port.
  The point at which data may be lost depends on the rate at which data is written to the pvuart device, the load on the VDS and the speed of the physical serial port.
  If data loss does occur, the user should either reduce the rate at which data is written to the pvuart device or use ssh to connect to the VDS rather than using a physical serial port.
- The LynxOS-178 guest fails to initialize low, high and full speed USB devices after reboot on the ARM Ultrascale+ target. Configuration of the LynxOS-178 guest OS for the ARM Ultrascale+ target requires USB to be passed with @ suffix to avoid the problem with low, high and full speed devices initialization after guest reboot.
- The UNIX socket can be written to (read from) after `shutdown()` has been called on it. Using the `shutdown()` routine for the UNIX socket puts the socket pipes into the list of the kernel free files, however these pipes continue to be used by this socket. It can result in the same 'struct file' being used by different kernel objects at the same time.
- Thread's signal mask is not restored correctly when user calls `siglongjmp()` from a signal handler.
- POSIX requires that `FE_INVALID` exception to be set for signaling NANs. The libm APIs return NAN for any NAN arguments leaving `errno` unmodified and do not raise any floating point exceptions when signaling NANs are passed.
- The `USE_CLOCK_TABLE()` and `DONE_CLOCK_TABLE()` macros implement a reference counting mechanism (for clocks other than `CLOCK_REALTIME`) indicating that a particular clock entry in the clock description table is in use to prevent a concurrent `clock_deregister()` from removing the clock. These macros do not have any locking which may lead to a race condition.
- The `link()`, `rename()` and `unlink()` calls do not distinguish between files and directory names.

- The `pthread_mutexattr_setpshared()` and `pthread_condattr_setpshared()` APIs do not provide intended functionality. Any request for `PTHREAD_PROCESS_PRIVATE` is silently ignored and functionality equivalent to `PTHREAD_PROCESS_SHARED`is always enforced by default or otherwise.
- The `symlink()` syscall can change the last modification time of the parent directory of a symlink to be created even if a symlink itself cannot be created (system call fails with `ENOSPC` for example).
- In some conditions, the `ftruncate()` system call cannot be interrupted by a signal.

Installation Issues

General Issues

- After uninstalling LynxOS-178 product, certain files added in the product tree by the user after installation will be left. Please remove these files and directories manually if they are not needed any more.
- When a product component is uninstalled, all files that it consists of are removed. Given that there are files that are included in multiple product components (e.g., BSP and APK components have common files), uninstalling an individual component may leave other components incomplete. To prevent this issue, the entire product should be uninstalled as a unit and then only the required set of components should be reinstalled.

Windows Host Issues

When using Windows as the Cross-Development host, the existence of Windows line termination characters in the `/etc/hosts` file prevents the developer KDI from automatically enabling networking. To enable networking, the user must execute the `ifconfig <interface_name> <ip_address> up` command. Please use the `ifconfig -a` command to get full list of available interface names.

Luminosity Issues

General Issues

- If Luminosity runs on Centos 6.6 with cairo version less than 1.9.4 and GTK version greater or equal 2.24, Luminosity can crash printing the following error message:

  ```
  java: cairo-misc.c:380:
  _cairo_operator_bounded_by_source: Assertion
  `NOT_REACHED' failed .
  ```

  To fix this, add the following line in the end of the *<inst_dir>*`/eclipse/luminosity.ini` file:

  ```
  -Dorg.eclipse.swt.internal.gtk.cairoGraphics=false
  ```

  where *<inst_dir>* is a Luminosity installation directory.

- If Luminosity runs on CentOS 7.x with GTK version 3.22.x, Luminosity can slow down or even crash printing the following messages on the screen:

  ```
  (Luminosity:29675): Gtk-WARNING **: Negative content
  width -6 (allocation 1, extents 4x3) while allocating
  gadget (node toolbar, owner GtkToolbar)
  ```

  ```
  (Luminosity:29675): Gtk-WARNING **: Negative content
  height -3 (allocation 1, extents 2x2) while allocating
  gadget (node toolbar, owner GtkToolbar)
  ```

  To fix this, invoke Luminosity in the environment where the `SWT_GTK3` variable is set to 0, e.g.:

  ```
  $ export SWT_GTK3=0
  $ ./luminosity
  ```

- For full operating, Luminosity IDE should be started in the native host environment. That is, the Luminosity IDE should not be started from the shell where `. SETUP.bash` command is executed to get a Cross-Development Environment. Otherwise, the native C development will be impossible.

- On start, Luminosity IDE can report:

  ```
  No Luminosity license is found. The Lynx plug-ins are
  disabled.
  ```

  This means that Luminosity cannot find the license. The detailed analysis of the detected problem will be put in the *<inst_dir>*`/eclipse/workspace/.metadata/.log` file where *<inst_dir>* is a Luminosity installation directory

`/opt/Lynx/LynxOS-178-2.2.5/Luminosity/6.0.0`. As a rule, to fix the problem the following steps can be used:

- On Linux host, set `LM_LICENSE_FILE` variable before launching Luminosity as:
  ```
  $ export LM_LICENSE_FILE=<path_to_license_file>
  $ ./luminosity
  ```
  where *<path_to_license_file>* is full path to the license file or `@`*<hostname>* where *<hostname>* is a host where License Manager `lmgrd` is running.
- On the Windows host, set `LM_LICENSE_FILE` variable using **System->Advanced->Environment Variables** dialog and try again.

Installation Issues

Uninstallation of the Luminosity IDE can fail if another user has made an attempt to perform this beforehand. If this occurs, remove the Luminosity installation directory from the command prompt.

Build Issues

- In external projects if the active configuration is changed and the project is rebuilt, information about the executable format displayed in the **Project Explorer** view may be incorrect. To avoid this, collapse the project in the **Project Explorer** view before rebuilding it.
- Sometimes a project can be built twice if the **Build Automatically** option is switched on in the main Projects menu.
- A project is not automatically re-built after the D2U conversion. Use the **Clean Project** menu item to rebuild it.
- Driver project build can fail if the driver entry points duplicate names already present in the Kernel.
- Clicking the **Apply** and **OK** buttons in the Project **Properties** dialog while build is running may cause the Luminosity IDE hanging for a few minutes.
- If a Kernel project is built, the `Duplicate paths` warning can appear in the **Problems** view. This warning is generated because the Release and Debug configurations have the same output directory for Kernel projects. Safely ignore this message.
- When a kernel project is built `$ENV_PREFIX/etc/ttys` and

`$ENV_PREFIX/etc/tconfig` files in the environment are re-generated.

Project Issues

- When a Cross-Development Environment is removed from the list of platforms supported by a Kernel project, the corresponding directories are not deleted.
- `all` and `clean` are reserved for target names in project Makefiles and cannot be used as project names.
- `Mutex` cannot be used as a project name.
- Some names such as the `memory` , `streambuf` , and `strings` names are reserved for C++ header files and cannot be used as project binary names. Refer to the **`Window->Preferences->C/C++->File Types`** dialog for the full list of the reserved names.
- A project cannot be created in a read-only directory. No error messages will be displayed.
- In the VCT editor for LynxOS-178 Kernel projects, if errors are detected during the VCT file parsing, the warning dialog is displayed. The dialog describes the detected errors and asks the user to confirm further actions. In case the user confirms this, the errors are automatically fixed and the editor opens.
- The Luminosity VCT editor does not support VCT files with `m4` directives. Do not change such files in the Luminosity Kernel projects by using either external or internal text editors after the pure VCT files without `m4` directives are produced by the project build. Instead, use the **`Remote System Configuration->Edit VM Configuration...`** item in the context menu to change VM configuration.
- The Luminosity VCT editor can show warning after a new VN is added using the **`VM`** tab. Please ignore it.
- In the editor, the built-in C/C++ parser may show errors that are not printed by the compiler on a project build. Ignore these errors as they will disappear after the Luminosity IDE is re-launched.
- The Makefile files in the Kernel and managed driver projects are read-only. On attempt to change them, a dialog suggesting to allow write access privileges appears. Should the user agree to allow write access privileges, all changes will then be lost.
- The Luminosity spec editor does not support spec files with `m4` directives. Do not change such files in the Luminosity Kernel projects by using either an external or an internal editor once the pure spec files (without `m4` directives) are produced by the project build. Instead,

change the pure spec file.

- Kernel images built by the Luminosity Kernel and driver projects do not display information about the build date and the Operating System version upon initial booting.
- For Lynx C Projects, the project **`Properties->Tool Chain Editor`** dialog shows empty value instead of Lynx toolchain in the **`Current toolchain`** box.

Debug and Run Issues

- If the Luminosity IDE or **`Debug`** view is closed while the debug session is still running, the application being debugged may continue running, therefore preventing a subsequent upload. As a workaround, close the application on the target before uploading.
- Variables in the **`Variables`** view might be displayed with an error mark and the subscription `Target is not suspended`. When the application stops, this error mark disappears.
- An attempt to debug applications built for another platform may cause the `Target selection failed` error message.
- When multi-thread applications are debugged, the selection in the **`Debug`** view may be lost.
- Debugging and running applications via the serial line may run unusually slow. Instead, use the network connection if it is possible.
- When exiting a debug session, a gdb exit code different from 0 may be displayed in the **`Debug`** view.
- When the debugger is stopped inside a function without source code available, the **`Editor`** view shows the message `No source available for (<`*`function`*`>())` and the source of the debugged project disappears. Position the calling stack to move toward the frame with source.
- The **`Modules`** view shows shared libraries contents only so it is always empty in LynxOS-178 cross-development debug sessions.
- Opening the debug session may sometimes fail. If this occurs, initiate the operation again.
- A debug session can fail to launch if the **`Binaries`** folder is not displayed in the **`Project Explorer`** view. If this occurs, switch between workspaces to restore the folder.
- Serial port sharing between the console and kernel debugger does not

work at this time.

- The debug control buttons in **Debug** view may become enabled before the debug session is fully established.
- The kernel debugging is not supported.
- Debugging is not supported for LynxOS-178 targets running in Production Mode.
- Post-mortem debugging requires `/rwfs` directory existing and having write permissions on the target. Otherwise the core file will not be generated.

Host Shell

- The **Host Shell** view does not support `ncurses` based applications.
- The **Delete** button works the same way as the **Backspace** button.
- The **Host Shel**l icon can be disabled on the toolbar if no project is selected. To enable it, click a project or its subdirectory in the **Project Explorer** view.

Host File System

- A file selected in the **Project Explorer** view cannot be dragged and dropped in the **Host File System** view if there is selection on a file entry.
- On the Windows host, changing the read only attribute of a folder is not supported.

Direct Access

- On CentOS 7.x, if SELinux is installed, the direct access to targets/hosts may not work if the selinux-policy RPM package has version 3.7.19-126. Update the packages to version 3.7.19-154 or higher.
- Direct access is not supported for LynxOS-178 targets running in Production Mode.

Remote File System View

- The contents of a directory where the current user has read only permissions is not displayed.
- Working with **the Remote File System** view via the serial line may

run unusually slow. Instead, use the network connection if it is possible.

- If the **Remote File System** view is closed while obtaining information from the target, an error message may be displayed.
- The **Remote File System** view is not supported for LynxOS-178 targets running in Production Mode.

Remote Target System Viewer

- Working with the Remote Target System Viewer via the serial line may run unusually slow. Instead, use the network connection if it is possible.
- The Remote Target System Viewer reports error if started while a kernel debug session is open.
- The **Control** terminal column is empty in the **Processes** view if the LynxOS-178 target is running in Production Mode.
- The **Process** view displays double `lwsrvr` process entries if the **Show process hierarchy** option is enabled.
- The **CPU ID** column is empty in the **Process** view if the LynxOS-178 target is running in Production Mode at this time.
- In the **Summary** view, load average values are unavailable for LynxOS-178 targets.
- If a target is rebooted when the Remote Target System Viewer is running, the connection may break and the **Reconnect** button will be displayed. If clicking this button does not restore the connection, then close all views using the **Close All** button and click the **Remote Target System Viewer** icon again.
- The Remote Target System Viewer may fail if the communication between the LOCI Server and LOCI Proxy is performed via a serial line.
- Remote Target System Viewer can stop running sometimes showing the `Connection is lost` message. Use the **Reconnect** button to restore connection with the target. This situation can occur, for example, if the date is set incorrectly on the target.
- The preference setting of views that should be opened by clicking the **Remote Target System Viewer** icon can be ignored.
- Task names are empty in the **Tasks** view if the target runs in the Production mode.

SpyKer GUI

- After the Zoom tool is used, the ruler may contain no time labels. Scroll the event panel to the left or to the right to show the nearest time label.
- Events with the same timestamp cannot be viewed by the SpyKer tool separately from each other and are always “aggregated” in the display.
- For wrapped traces the SpyKer tool may mislabel the name of a thread when the original thread exits and the thread ID is reused by a new thread.
- To allow the SpyKer tool to load large traces (>2.5 MB), the Java heap size should be no less than 25 times the trace size. To increase the Java heap size, restart Luminosity using the following command:

  ```
  # ./luminosity -vmargs -Xmx<size>m
  ```

  where *<size>* is the Java heap size in MB.

  NOTE : Even larger heap may be required to perform various operations with the trace. If the Java out of memory error message appears, restart Luminosity with an increased Java heap.
- When a trace is opened, the following warning may be displayed:

  ```
  Warning: there is no one-to-one correspondence between
  the Interrupt events in the trace. The following GUI
  features may work improperly:
  IRQ detailed information (the IRQ tasks)
  ISR state indication
  ISR Histogram
  ```

  This means that there is not a one-to-one correspondence between the Interrupt and Return from Interrupt events in a trace. In most cases these warnings can appear if there are overruns during trace capture or if triggers are used.
- When displaying a trace, Luminosity can display the warning message `Events are out of order`. Safely ignore this message.
- SpyKer can display the following warning messages for traces with the Wrap mode event:

  `Warning: no supervisor/user mode change events for <thread name> thread after hole.`

  This means that SpyKer cannot detect the actual state of the *<thread name>* thread and will assume that this thread is always in the system state.

  The message can occur without wrap mode. Then there is no `after whole` in it.
- Library calls tracing is not supported for LynxOS-178 targets.

- The Measure tool does not resize the measure bar after resizing the window. After using the tool, the scroll bar position does not match an updated window.
- In the **`Memory Usage`** panel, if the Kernel memory value is negative, the user memory histogram can be outside of the top or bottom edge of the panel.
- Collecting a SpyKer trace via serial line is slow. Use the network connection if possible.
- When a trace is being searched then after the last event is detected, and the trace is clicked, the vertical line which marks the found event disappears and `Event not found` is shown in the bottom string. One more click starts searching from the point of the trace that is clicked.
- When a new event is added in the **`SpyKer Events`** preference dialog, to enable the buttons located on the right, click an existing event in the appropriate table.
- The SpyKer trace collection may fail if the target is heavily loaded.
- Once a trace is collected and the **`Display`** button is clicked, the `Disconnected. I/O error` message can appear in the **`Log`** box. Please ignore this message.
- If a trace is saved with VM filter, it will be shown as empty. Close the view and display the saved trace in a new view.

GUI Issues

- **`Remote File`**, **`Remote File System`**, **`Target System Viewer`**, **`SpyKer`**, **`Target Login`**, **`Application Debugged`**, and **`Host Shell`** views if opened using the **`Window->Show View`** menu item do not display any contents. Use corresponding **`Lynx`** menu items or toolbar icons to open these views.
- The Luminosity IDE may hang for a few minutes if a large binary is expanded in the **`Project Explorer`** view.
- Functional keys as well as hot keys can fail to work properly. Use mouse instead.
- Lynx C++ creation wizard can require scrolling.

Targets View

- Switching to a new workspace removes the default target selection.

- Currently, different remote target entries may not possess the same MAC address.

Remote Copy

- When a file is copied to a remote target, the progress bar remains empty not displaying the operation progress.
- Copying files via the serial line may appear slow. Use a network connection if possible.
- Copying files is not supported for LynxOS-178 targets running in Production Mode at this time.

Target Login

Target Login functionality is not supported for LynxOS-178 targets running in Production Mode at this time.

Import

- The Luminosity IDE may not operate properly if an attempt to import a Luminosity project using the **`Import->General`** menu item is made. Use the **`Import->LW Projects`** menu item instead.
- Import of Kernel and driver projects is not supported.

Help

- The Help->Check Update dialog produces an error. This function is not supported.
- When Luminosity online help is used, the messages similar to the following ones can be printed in the terminal:

```
2018-02-22 08:06:39.462:INFO::Start Help Server:
Logging initialized @190473ms to
org.eclipse.jetty.util.log.StdErrLog
```

```
2018-02-22 08:06:39.555:INFO:oejs.session:Start Help
Server:DefaultSessionIdManager workerName=node0
```

```
2018-02-22 8:06:39.555:INFO:oejs.session:Start Help
Server: No SessionScavenger set, using defaults
```

```
2018-02-22 08:06:39.556:INFO:oejs.session:Start Help
Server:Scavenging every 660000ms
```

  To disable such messages, change the

<inst_dir>/eclipse/luminosity.ini file by adding the following line:

```
-Dorg.eclipse.jetty.LEVEL=OFF
```

after the line -vmargs where *<inst_dir>* is Luminosity installation directory and then re-launch Luminosity IDE.

Miscellaneous

- A diskless target may print the `No space left on the device` error message when the user attempts to debug or run an application. Rebuild the KDI reserving more free space in the file system.
- If Luminosity IDE ends incorrectly (by receiving a signal), the `lwproxy` process can remain running, thus preventing successful validation of a remote target in the subsequent Luminosity session. Remove this process before launching Luminosity again.
- SSH and FTP types of connection with the target do not work if the user account has no password.
- On Luminosity start, if License Session Manager is running for a cross platform that is registered in Luminosity IDE an error message may be displayed. You can safely ignore this error message.

SpyKer Issues

General Issues

- The Interrupts/Return from Interrupts events are the most frequent in a typical trace. These events typically consume the majority of the trace buffer space. Unless logging these events is requirement for a typical debug session, it is recommended that the user disables logging component. This will decrease the size of trace data, enhance the associated buffer space that is required, improve overall GUI performance, and create less impact caused by SpyKer on the target system.
- Wrap mode does not work if the trace is stored into a file on the target. To utilize the wrap mode without the GUI, use the `:file - ;` command to disable continuous logging of events into a file. What follows is an example when using the wrap mode via a command file. This both allows wrap mode and deploys a stop trigger for the process exit event:

  ```
  :etrig 9 ;
  :buffers 40 512 0 ;
  :file - ;
  :wrap 1 ;
  :start
  ```

  When using the command file outlined above, SpyKer will run in the wrap mode. As soon as the process is complete, all contents are then written to the out.trc file.
- File names longer than 31 characters are not saved to the SpyKer traces correctly.

LynxOS-178 Issues

- The Library instrumentation feature is not supported on the LynxOS-178 targets.
- The displaying of a captured trace in Luminosity IDE may be slow.
- On LynxOS-178 targets, `showtrace` outputs may display an invalid timestamp for the very last event in a trace.

LOCI Issues

General Issues

- The Luminosity target server (`lwsrvr`) and the LOCI driver can affect some system performance characteristics such as system response time and context-switch time.
- Only verification, Target System Viewer, and SpyKer sessions are supported in LynxOS-178 when operating in Production Mode.
- Communication between LOCI Proxy and LOCI server can be slow if the serial line is used.

NFS Issues

Some operations with the NFS file system may fail if the file or directory permissions on the NFS host are not set correctly. A typical example occurs when the `uid` or `gid` files on the NFS host are different from the `uid` and `gid` on the target. Suggested ways to resolve this issue are:

1. Maintain the same `uid` and `gid` files on the NFS host and on the target.
2. Turn off root squashing for the exported NFS tree on the host and allow the `root` user on the target to handle the exported NFS tree as a root.
3. Use `all_squash` along with the `anonuid` and `anongid` options for the exported NFS tree. This will allow all client requests to operate correctly with `uid` and `gid` specified in the `anonuid` and `anongid` options.

Each solution has its own pros and cons. Solution 1 may not desirable or may not be applied if, for example, the file systems on the target and on the host were created independently. Solution 2 may not be desirable for the host administrator. Solution 3 allows one to prevent the root access to the exported tree but doesn't provide enough flexibility.

The access to the NFS files is handled on both sides. The NFS server performs an operation on a file according to its permissions and the client's `uid` and `gid` (after squashing in case the client's `uid` and `gid` are zero and `no_root_squash` is not specified). The target system also checks permissions and the user capabilities.

lwproxy Start-up on Windows

The `lwproxy` command may fail to start on Windows host if the older version of `lwproxy` was used previously on the same machine. If `lwproxy` reports the `Can't open loci database` or `Couldn't import public key` error and

then quits, open the registry by invoking the `regedit` command and manually remove the following registry key:

```
HKEY_CURRENT_USER\Software\Lynx Software Technologies, Inc.\LWPROXY
```

The `Can't open loci database` error can also occur if `lwproxy` is already running on behalf of the same user. In this case kill the old process and try again.

LynxOS-178 SSL Limitations

LynxOS-178 targets do not support SSL. Therefore, it is only possible to encrypt communications between `lwproxy` and LOCI clients (such as Luminosity) when using LynxOS-178 targets. The communication channel between `lwproxy` and `lwsrvr` will remain unencrypted.

lwsrvr Issues

The `lwsrvr` binary built for the LynxOS-178 Production Mode is named `lwsrvr_pdn`. It supports the restricted set of sessions:

- Verification
- Target System Viewer
- SpyKer

To provide a SpyKer session, it calls the `stracerd` SpyKer daemon. Although the SpyKer daemon has the `stracerd_pdn` name in Production Mode, it should be copied into the target file system as `stracerd`.

LCS Issues

The following limitations are known to exist for this release:

- The LCS TCP/IP stack provides the restricted set of the routing messages. Specifically, it provides the following types of the routing commands:
  - `RTM_GET` — report metrics and other route information
  - `RTM_ADD` — add a route
  - `RTM_DELETE` — delete a route
- The `route` utility executed without parameters does not display the routing table information.
- The `lcsnetstat -R` command does not display any arp information of the interfaces.
- The `arp <hostname>` command does not display host specific arp information of the interfaces.
- The `ifconfig -a` command does not display any status of the interfaces.
- The `ifconfig` utility executed without an interface name does not display the status of interfaces.
- The `recvfrom()` call is not available for TCP sockets.
- The `netstat` utility is not supported by LCS. `lcsnetstat` should be used instead.

  Please note that only an LCS interface connected to a physical interface can have the MTU configured.

LCS Limits

Table 3-2 outlines the numerical default limits used in the LCS v2.2.0. Socket limits can be changed with `SockLim` option. The TCP send and TCP receive buffers size can be changed with `TCP_SockBufSize` option. Please refer to the *Lynx Certifiable Stack v2.2.0 User's Guide* for the further details.

Table 3-2: LCS Numerical Default Limits

Limit	Value	User Impact if Limit is Reached	Scope	Description
All sockets	256	The `ENOBUFS` (No buffer spaceavailable) error is returned.	VM	The limit on the total number of all the sockets (tcp, udp, and raw sockets) in the current VM.
Network interfaces	8	The `ENXIO` (No such device or address) error is returned.	System	The limit on the number of network interfaces including the loopback interface lo that is always present.
Interface name	16	A longer name is truncated silently.	System	The limit on the length of a network interface name.
IP addresses	16	The `ENOBUFS` (No buffer spaceavailable) error is returned.	Network controller	The limit on the number of IP addresses that can be configured for a network controller.
Multicast IP addresses	20	The `ETOOMANYREFS` (Too many references) error is returned.	Socket	The limit on the number of multicast IP addresses that can be configured for a socket.
Host routes	31	The `ENOBUFS` (No buffer space available) error is returned.	VM	The limit on the number of host route entries which can be configured for the current VM.
Net routes	31	The `ENOBUFS` (No buffer space available) error is returned.	VM	The limit on the number of net route entries that can be configured for the current VM.
Address resolution entries	32	No error is returned. Result can be checked using `RTM_GET ioctl()`.	VM	The limit on the number of entries in the address resolution table of the current VM.

Table 3-2: LCS Numerical Default Limits (Continued)

Raw sockets send	94	`EMSGSIZE` (Message too long) error is returned.	System	The limit on the size of the message sent via a raw socket.
TCP receive buffer	32768	No error is returned for the `setsockopt()` call. The TCP receive buffer size is set to the maximal value (32768 bytes) silently.	System	The limit on the TCP receive buffer size. 4 bytes are reserved for a size of data in the buffer. So, the data size is limited to 32768 - 4 = 32764 bytes.
TCP send buffer	32768	No error is returned for the `setsockopt()` call. The TCP send buffer size is set to the maximal value (32768 bytes) silently. The `EMSGSIZE` (Message too long) error is returned for the `send()` call.	System	The limit on the TCP send buffer size. 4 bytes are reserved for a size of data in the buffer. So, the data size is limited to 32768 - 4 = 32764 bytes. An application cannot send more than 32764 bytes using one `send()` call.
TCP accept queue size	256	The `ECONNREFUSED` (Connection refused) error is returned.	Socket	The limit on the size of an accept queue of each listening TCP socket.
MTU	1500	The `EINVAL` (invalid argument) error is returned.	System	Maximum allowed MTU value

There are a number of buffer pools used in LynxOS-178 for passing network messages through the TCP/IP stack. User's code gets the `ENOMEM` error when the corresponding pools are full in case of RAW, UDP sockets and blocks or gets the `EWOULDBLOCK` error in case of TCP sockets.

Note that these pools are reserved when the `lcsd` daemon is started. Therefore, each VM has its own pools.

Table 3-3: LCS Buffer Pools

Pool	Buffers Number	Buffer Size	Where Used
Interface pools (1-7)	`MAX_SOCKETS`	2 K	**Link layer**: Send/receive operations for the N-th networkinterface.
Main	3	2 K	**IP layer**: Send IP fragments (when message size > MTU). UDP layer: Send small (< 2K) messages.
Reassemble	`IP_FragQueueSize`** x `IP_MaxFragCount`***	2 K	**IP layer**: Receive IP fragments for reassembling.
Large buffers	`IP_FragQueueSize`**	64 K	**IP layer**: Store the reassembled from the received IP fragments message. **UDP layer**: Send large (>= 2K) messages.
TCP	`MAX_SOCKETS`* x32	2 K	**TCP layer**: Send/receive TCP messages.
Raw sockets	8	2 K	**RAW layer**: Receive raw socket messages.
ICMP	4	2 K	**RAW layer**: Send raw socket messages. **IP layer**: Send ICMP echo reply.
Small buffers	`MAX_SOCKETS`* x32	128 b	**RAW layer**: Send ARP requests, routing get requests. **IP layer**: Send IGMP response. **UDP layer**: Send UDP messages (store UDP header in thebuffer). **TCP layer**: Send TCP control messages (SYN, ACK, RST, FIN, and so on).

Default values for constants in table (refer to the *Lynx Certifiable Stack v2.2.0 User's Guide* for the description of these variables):

- * `MAX_SOCKETS`: 256
- ** `IP_FragQueueSize`: 10
- *** `IP_MaxFragCount`: 70