A System Administration Primer for the Sequent Symmetry

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RISC-Linz

April 1992

1 General

This guide describes the configuration of the RISC-Linz Sequent Symmetry and the conventions that the current system administrator(s) for this machine have agreed upon.

1.1 Maintenance

As long as we have no additional system operator for the Sequent, the maintenance of the machine is organized by the following persons (that alone know the root password):

1. Karoly Erdei is in charge of the general maintenance, in particular of the user management and of the setup of public services (mailing, printer connection, backups, ...).
2. Wolfgang Schreiner is in charge of the initial setup of the machine and of supervising the installation of software packages, in particular for parallel programming (see the remarks in Section 7).

The machine was installed in the first week of October 1991; we have a guaruantee on hardware and software (including free software updates) for one year. The correspondence with Sequent can be found in a box on the right hand of Wolfgang Schreiner's desk. Our main contact to Sequent is the technical hotline, that can be reached Monday to Friday (during the working hours). Its phone number is listed inside the front door of the machine.

1.2 Hardware and Software Configuration

Our machine is of type *Sequent Symmetry S81* and is currently equipped with the following items:

- 20 processor units Intel 80386/80387,
- 128 MB main memory,
- 8 disks with 540 MB space each (4.3 GB disk space in total),
- 64 serial asynchronous connections,
- a 1/4inch standard tape (60 MB),
- a 8mm Exabyte tape (1 GB),
- a modem,
- a system console.

Further upgrades might include additional processors (up to 30), newer processors (Intel 80486), more main memory and disk space.

The system is running under the *Dynix/ptx V1.3.1* operating system, which is a parallel derivate of the Unix V.3 system and for which RISC has a 1000 user license.

The machine is located in the computer room of the castle (beneath the parallel lab 0.7). There exist two keys for the machine one of which is kept by Karoly Erdei and Wolfgang Schreiner, respectively. Inside the front door of the machine, there are several sheets with the hardware configuration of the machine, its serial number and the password for setting the user limit. Either the door of the computer room or to the parallel lab should be locked outside the working hours.

Important: The water bin for the air-conditioner in the computer room has to be regularily emptied (at least twice a week), otherwise the floor of the computer room is watered!

2 Booting the Machine

In general, the machine will be never switched off. After a shutdown with option $-i6$, the machine boots automatically provided that the AUTO light is on. Otherwise, you have to type 'b' when an asterisk appears on the system console to boot the machine.

If the machine is turned off, the following actions have to be taken:

1. Reassure that the 3-phase power supply is switched on (look at the switch COMP1 in the second fuse box of the computer room).
2. Switch on the cabinet by pressing the button at the bottom of the back door.
3. Switch on the disks. One of the disks might have problems to come up (the panel of one disk does not work correctly). However, we will get a new panel soon.
4. Insert the key and switch the machine on.

When the machine has booted, confirm that the AUTO light is on (you might have to press the AUTO key), then turn the key to SECURE (the corresponding light is switched on) and pull the key off. Now pressing keys on the machine does not have any effect.

For turning the machine off, take the above actions in *reverse* order. In general, you will not want to disconnect the whole machine from electrical power but only switch it off. In this case, it suffices to insert the key and turn it to OFF. For resetting the machine, just press the RESET key (confirm that the SECURE light is not on).

3 Physical Disk Structure

We have eight disks of 540 MB each. The space on each disk is divided into several partitions, as a general convention, each partition is named `zd`i`s`j (partition j on disk i). The first disk contains four partitions:

1. The `root` partition (25 MB) from where the operating system is booted.
2. A `swap` partition of 100 MB.
3. The `usr` partition (175 MB) where most of the operating system is located.
4. The partition `zd0s3` (240 MB) for general purpose.

All other disks i ($1 \leq\subset\leq 7$) have three partitions:

1. `zd`i`s0` (100 MB): On disks 1–3, these partitions contain additional swap space (hence we currently use 400 MB swap space in total). On disks 4–7, these partitions are for general purpose (maybe they will serve as additional swap space in the future).
2. `zd`i`s1` (200 MB): On these partitions, generally the user files are located.

3. `zd`*i*`s2` (240 MB): On these partitions, generally software packages are located.

As a general rule, all disks should be equally loaded (with swap space, user files and software packages) in order to improve disk performance.

Attention: There must be always enough swap space to contain a dump of the whole system memory (128 MB) since after a system crash the memory is dumped into the swap partition. If there is not enough swap space availabe, the dump will overwrite the contents of the partition following the last swap partition!

4 File System Structure

We tried to organize the file system in a clear and concise way such that at any time it is obvious what software packages are available, where they are (physically and logically) located and that no software package is installed twice. Moreover, at any time it should be possible to move any package and any user from one physical location to another without change to the user interface.

Below the root file system (/), the `usr` file system is mounted (/usr). In this directory, three important subdirectories do exist:

- `/usr/fsys`: Below this directory, all file systems of all disks are mounted, e.g. `/usr/fsys/zd4s2` denotes the file system on the second partition of disk 2, where (probably) several software packages are physically located.
- `/usr/local`: Below this directory, there exists one directory entry for each software package installed, e.g. `/usr/local/tex`. However, this entry is only a symbolic link to the physical location of the package, e.g. the link `/usr/local/tex -> ../fsys/zd5s2/tex`.
- `/usr/users`: Below this directory, there exists one entry for the home directory of each user, but as for software packages, this entry is only a symbolic link to the physical location of the user's home directory, e.g. `/usr/users/schreine -> ../fsys/zd3s1/schreine`.

Hence, we have to seperate file system structures connected by symbolic links:

- A physical structure (reflected by the `/usr/fsys` entries) denoting the locations where all user files and software packages are actually stored.
- A logical structure (established by `/usr/local` and `/usr/users`) by which all users access files and programs regardless where they are actually located.

Users should access their files only by the logical hierarchy, since the system mainteners may at any time (without preannouncements) decide to change the physical location of user directories and software packages.

Symbolic links should be only used to establish the connection between the physical structure and the logical ones, i.e. a symbolic link should always connect the logical location of a directory to its physical one (without any indirections).

There exist several special directories that are also realized by symbolic links:

- `/tmp` and `/usr/tmp` are both linked to the same directory in a partition with sufficient free space.
- `/usr/crash` (which contains the core dump after a crash of operating system) is linked to a sufficiently large partition.
- `/etc/conf` (where the configuration of the current operating system kernel is stored) is a symbolic link to `/usr/conf`.

Attention: Symbolic links should be only established relative to the current position, e.g. a symbolic link may look as follows: `tex -> ../fsys/zd4s2/tex` but *not* `tex -> /usr/fsys/zd4s2/tex`. This is important for using NFS, since only the `usr` file system (and not the whole root file system) will be exported to other machines.

5 User Management

Each user at RISC (but also students, guests and other people) will get an account on the Sequent. As a general rule, an account should only given to specific users (physical persons) and software package mainteners (juristical persons), i.e. no "collection accounts" should be established. This prevents people to modify the files of other people and in general improves network security.

User names are restricted to 8 characters (System V restriction), the automatic password restrictions (minimum length and at least one digit) will not be turned off. Accounts of persons that leave RISC should be immediately revoked (with prior backup of user files) unless there is a special reason for keeping the accounts (the person will come back in a certain time or still works on the machine, ...). However, in this case, the group permission `risc` might be changed to `external` (next section).

The installation of a new user proceeds as follows:

1. **Administration Menu:** Create a new user account in the 'menu' program. Give the new user an unique id number, a home directory in `/usr/users`, a primary group (e.g. `risc`) and an unique name (maybe an initial password). The id number should be modelled after the primary group numbers. E.g. if group `risc` has number 20, users within this group will be numbered starting with 200.

2. **Secondary Groups:** Go to the group management menu and add the user to the diverse secondary groups (e.g. `parlab`) as requested by the person applying for the new account. Then leave the adminstration menu.

3. **Move Home Directory:** The user directory is now installed below the directory `/usr/users`, i.e. the files reside physically in the partition `usr`. Look for the least loaded partition zd*i*s1 ($1 \leq i \leq 7$) where to move the user directory to (by default, users are always installed in the first partition of each disk, while software packages are installed in the second one). Issue the command `mvuser <name> <partition>` that will move the directory to the desired partition and installs a symbolic link into the directory `/usr/users`.

Hence, the home directory of each user in `/usr/users` is actually a symbolic link to its physical location, e.g. `schreine -> ../fsys/zd3s1/schreine`. This allows the system mainteners to move user directories to other physical locations without change to the user interface.

However, the difference between logical location and physical location might confuse some users. If user `schreine` types `cd ../siegl`, he will probably *not* get into the home directory of `siegl`: `cd ..` changes the directory not to `/usr/users`, as desired, but to `/usr/fsys/zd3s1`, while the home directory of `siegl` might be in a different partition! As a consequence, users should never use pathes relative to their home directories but use absolute pathes in the logical hierarchie (`/usr/users/siegl`) or shortcuts as `~siegl` (in the C-Shell).

Attention: It should be never the case, that users install software packages of general interest in their home directories! For all software packages, seperate maintenance accounts will be established and the packages will be entered into the `/usr/local` directory (see Section 7).

6 Group Management

On the Sequent, a hierarchy of groups handles access restrictions:

- `risc` for all regular users at RISC-Linz. Each `risc` user will be also in (at least) one of the following groups:

  - `parlab`: the Parallel Computation Lab.
  - `calab`: the Computer Algebra Lab.
  - `salab`: the Soft Automation Lab.
  - `nnlab`: the Neural Network Group.
  - `gralab`: the Graphics Group.
  - `medlar`: the Medlar Group.
  - ...

  Several groups of RISC-Linz can then restrict access to certain files to members of the own group only (e.g. the bibliography files of the parallel computation lab).

- `student` for students involved in programming projects or similar. Students may be also given the permissions of the labs they are working in.
- `guest` for guests working for a limited time (several weeks) at RISC-Linz. Guests may be also given lab permissions.
- `external` for people not working at RISC-Linz but having accounts of our machines. There will be at least the subgroup
  - `acpc` for members of the Austrian Center of Parallel Computation.
- `software` for software accounts (see the next section).

Access restrictions should in general be handled by group permissions and not by accounts that many people have access to.

7 Software Management

For each software package, an account is established with a home directory in `/usr/local` and with the same name as the directory, e.g. user `tex` and directory `/usr/local/tex` (which is a symbolic link to its physical location). All software accounts become group `software`.

The binaries, libraries and manual pages of each software product will be established in `/usr/local/bin`, `/usr/local/lib` and `/usr/local/man/man1` (for man page section 1). These directories are owned by `root` but belong to and are writable by group `software` (the directories are actually also symbolic links to physical locations).

The idea is that software packages can be installed by ordinary users without requiring `root` permission. The maintener of the package is the only person in charge for its correct setup and general reusability. Requests and complaints have to be sent to that person. There is a file `/usr/local/software` that contains a one line description of each software package available and the name of maintener.

Attention: Users are definitely not allowed to install software packages in their own home directories if these packages might be of any interest for other persons, too. This in general applies to *all* software received from public domain sources. We definitely want to prevent to have several versions of the same package be installed while most users do not know that this software is available at all.