Container init process

Problem

To enable running multiple processes, containers require process/service management. This is normally provided by some kind of init task (e.g. from sysvinit).

There are Docker-compatible replacements for full-fledged init's. Unfortunately they require either custom init scripts or service configurations (https://wiki.gentoo.org/wiki/Comparison_of_init_systems). The process of migration from OS-provided OpenRC init scripts is time consuming and error prone.

Usage of system's default sysvinit is hampered by following shortcomings:

- it mostly does not respond to Unix signals, which are used by Docker to manage containers (most importantly: signal termination),
- it does not stop properly on when Docker requests container to stop
  - attempt to stop container with init as PID 1 ends with error code 137:

```
CONTAINER ID   IMAGE          COMMAND        CREATED              STATUS                      P
ORTS   NAMES
b755c0f1b1d8   gentoo-base   "/sbin/init"   About a minute ago   Exited (137) 9 seconds ago
        gentoo-base
```

  - when invoking shutdown from within container, init process remains running afterwards, keeping container in running state:

```
# docker-compose top
gentoo-base
UID     PID     PPID    C   STIME   TTY     TIME        CMD
----------------------------------------------------------
root    3510    3489    0   17:40   ?       00:00:00    init [0]
```

Solution

Nevertheless it is possible to use sysvinit inside Docker container as an init process. Required steps are following:

1. Change sysvinit to exit init process on hard shutdown (runlevel 0) with following patch

```
--- sysvinit-3.01/src/init.c    2021-12-13 20:21:26.000000000 +0100
+++ sysvinit-3.01/src/init.c    2022-04-18 01:21:47.966751774 +0200
@@ -2367,6 +2367,11 @@
        read_inittab();
        fail_cancel();
        setproctitle("init [%c]", (int)runlevel);
+
+        /*
+         * Exit on halt - causes Docker container to stop.
+         */
+        if (runlevel == '0') exit(0);
    }
  }
        Write_Runlevel_Log(runlevel);
```

On Gentoo it's enough to put this patch inside */etc/portage/patches/sys-apps/sysvinit/exit-on-halt.patch* and reemerge sysvinit.

2. Change Docker signal for container termination to SIGINT and set appropriate action in inittab

Container's *docker-compose.yml*:

```
services:
  gentoo-base:
    ...
    stop_signal: SIGINT
```

/etc/inittab inside container - replace reboot action with shutdown:

```
# What to do at the "Three Finger Salute".
ca:12345:ctrlaltdel:/sbin/shutdown -h now
```