init(systemd)是太上老君,在父行程死掉後,wait回收子行程。(這時子行程的parent都是init)
若wait沒回收子行程,子行程變成zombie。

報告:(這次作業有請教:孫嘉成、許庭涵)

1. 產生zombie以後是否可以使用kill指令將zombie殺掉？

   可以,指令"kill 32756(process id)"。(此例為老師課前影片舉例)

2. 請附上截圖證明『zombie』的確會產生10個zombie

   (在程式sleep跑完前,用另一個視窗看有沒有zombie)

```
ariel      2136  0.0  0.1 540208  6448 ?        Ssl  16:42   0:00 /usr/libexec/xdg-document-portal
ariel      2150  0.0  0.7 495832 31188 ?        Sl   16:42   0:00 /usr/lib/ibus/ibus-engine-chewing --ibus
root       2239  0.0  1.0 421136 41488 ?        Ssl  16:43   0:01 /usr/libexec/fwupd/fwupd
ariel      2817  0.0  0.7 430320 31684 ?        Sl   16:43   0:00 update-notifier
ariel      2818  0.0  0.1 171400  6412 ?        Ssl  16:43   0:00 /usr/libexec/gvfsd-metadata
ariel      3555  0.0  0.1 171632  6372 ?        Sl   16:52   0:00 /usr/libexec/ibus-engine-simple
root      10991  0.0  0.0      0     0 ?        I<   17:09   0:00 [xfsalloc]
root      10992  0.0  0.0      0     0 ?        I<   17:09   0:00 [xfs_mru_cache]
root      10996  0.0  0.0      0     0 ?        S    17:09   0:00 [jfsIO]
root      10997  0.0  0.0      0     0 ?        S    17:09   0:00 [jfsCommit]
root      10998  0.0  0.0      0     0 ?        S    17:09   0:00 [jfsCommit]
root      10999  0.0  0.0      0     0 ?        S    17:09   0:00 [jfsSync]
root      21605  0.0  0.0      0     0 ?        I    17:18   0:01 [kworker/1:0-events]
root      21656  0.0  0.0      0     0 ?        I    17:21   0:01 [kworker/0:0-events]
root      22297  0.0  0.0      0     0 ?        I    17:29   0:00 [kworker/u256:2-btrfs-endio-write]
root      22368  0.0  0.0      0     0 ?        I    17:40   0:00 [kworker/u256:1-events_unbound]
root      22425  0.1  0.0      0     0 ?        I    17:43   0:01 [kworker/0:2-events]
root      22443  0.0  0.0      0     0 ?        I    17:43   0:00 [kworker/1:1-events]
root      22460  0.0  0.0      0     0 ?        I    17:48   0:00 [kworker/u256:0-btrfs-worker]
root      22481  0.0  0.0      0     0 ?        I    17:53   0:00 [kworker/0:1-events]
ariel     22506  1.7  1.3 750252 52252 ?        Ssl  17:53   0:04 /usr/libexec/gnome-terminal-server
ariel     22512  0.0  0.1  19824  5364 pts/0    Ss   17:53   0:00 bash
root      22521  0.0  0.0      0     0 ?        I    17:54   0:00 [kworker/1:2-events]
root      22525  0.0  0.0      0     0 ?        I    17:54   0:00 [kworker/0:3-events]
root      22527  0.0  0.0      0     0 ?        I    17:54   0:00 [kworker/1:3-events]
root      22528  0.1  0.0      0     0 ?        I    17:54   0:00 [kworker/1:4-events]
root      22529  0.0  0.0      0     0 ?        I    17:54   0:00 [kworker/1:5-cgroup_destroy]
root      22530  0.0  0.0      0     0 ?        I    17:54   0:00 [kworker/1:6-events]
root      22531  0.0  0.0      0     0 ?        I    17:54   0:00 [kworker/1:7-events]
ariel     22554  0.6  1.5 829620 60484 ?        Sl   17:55   0:01 /usr/bin/gedit --gapplication-service
root      22561  0.0  0.0      0     0 ?        I    17:55   0:00 [kworker/u256:3-events_unbound]
ariel     22584  0.0  0.1  19824  5292 pts/1    Ss   17:57   0:00 bash
ariel     22591  0.0  0.0   2364   524 pts/0    S+   17:58   0:00 ./a.out
ariel     22592  0.0  0.0      0     0 pts/0    Z+   17:58   0:00 [a.out] <defunct>
ariel     22593  0.0  0.0      0     0 pts/0    Z+   17:58   0:00 [a.out] <defunct>
ariel     22594  0.0  0.0      0     0 pts/0    Z+   17:58   0:00 [a.out] <defunct>
ariel     22595  0.0  0.0      0     0 pts/0    Z+   17:58   0:00 [a.out] <defunct>
ariel     22596  0.0  0.0      0     0 pts/0    Z+   17:58   0:00 [a.out] <defunct>
ariel     22597  0.0  0.0      0     0 pts/0    Z+   17:58   0:00 [a.out] <defunct>
ariel     22598  0.0  0.0      0     0 pts/0    Z+   17:58   0:00 [a.out] <defunct>
ariel     22599  0.0  0.0      0     0 pts/0    Z+   17:58   0:00 [a.out] <defunct>
ariel     22600  0.0  0.0      0     0 pts/0    Z+   17:58   0:00 [a.out] <defunct>
ariel     22601  0.0  0.0      0     0 pts/0    Z+   17:58   0:00 [a.out] <defunct>
ariel     22602  0.0  0.0  20632  3672 pts/1    R+   17:58   0:00 ps -aux
ariel@ariel-vm:~/system-programming/ch10$
```

STAT:Z+ , <defunct> 是zombie, 10個

3. 請附上截圖證明『nozombie』幾乎不會產生zombie

```
ariel        1981  0.0  0.3 382508 12472 ?        Ssl  16:42   0:00 /usr/libexec/gsd-datetime
ariel        1982  0.0  0.1 320612  6972 ?        Ssl  16:42   0:00 /usr/libexec/gsd-housekeeping
ariel        1985  0.0  0.5 354856 23376 ?        Ssl  16:42   0:00 /usr/libexec/gsd-keyboard
ariel        1992  0.0  0.6 697232 25720 ?        Ssl  16:42   0:00 /usr/libexec/gsd-media-keys
ariel        1997  0.0  0.5 355480 23776 ?        Ssl  16:42   0:00 /usr/libexec/gsd-power
ariel        2000  0.0  0.2 257156  9692 ?        Ssl  16:42   0:00 /usr/libexec/gsd-print-notifications
ariel        2004  0.0  0.1 466036  5928 ?        Ssl  16:42   0:00 /usr/libexec/gsd-rfkill
ariel        2005  0.0  0.1 244444  6164 ?        Ssl  16:42   0:00 /usr/libexec/gsd-screensaver-proxy
ariel        2007  0.0  0.8 647788 33300 ?        Sl   16:42   0:00 /usr/libexec/evolution-data-server/evol
ariel        2014  0.0  0.1 473668  7792 ?        Ssl  16:42   0:00 /usr/libexec/gsd-sharing
ariel        2016  0.0  0.1 324052  7612 ?        Ssl  16:42   0:00 /usr/libexec/gsd-smartcard
ariel        2024  0.0  0.2 328240  8432 ?        Ssl  16:42   0:00 /usr/libexec/gsd-sound
ariel        2030  0.0  0.1 467584  7188 ?        Ssl  16:42   0:00 /usr/libexec/gsd-usb-protection
ariel        2036  0.0  0.5 354364 23156 ?        Ssl  16:42   0:00 /usr/libexec/gsd-wacom
ariel        2040  0.0  0.1 322872  7180 ?        Ssl  16:42   0:00 /usr/libexec/gsd-wwan
ariel        2043  0.0  0.1 231800  5172 ?        Sl   16:42   0:00 /usr/libexec/gsd-disk-utility-notify
ariel        2046  0.0  0.5 355672 23640 ?        Ssl  16:42   0:00 /usr/libexec/gsd-xsettings
ariel        2055  0.3  0.7 301468 29444 ?        Sl   16:42   0:15 /usr/bin/vmtoolsd -n vmusr --blockFd 3
ariel        2081  0.0  0.2 351128 11576 ?        Sl   16:42   0:00 /usr/libexec/gsd-printer
ariel        2116  0.4  8.7 1489092 351380 ?      Sl   16:42   0:22 /snap/snap-store/518/usr/bin/snap-store
ariel        2136  0.0  0.1 540208  6448 ?        Ssl  16:42   0:00 /usr/libexec/xdg-document-portal
ariel        2150  0.0  0.7 495832 31188 ?        Sl   16:42   0:00 /usr/lib/ibus/ibus-engine-chewing --ibu
root         2239  0.0  1.0 421136 41488 ?        Ssl  16:43   0:01 /usr/libexec/fwupd/fwupd
ariel        2817  0.0  0.7 430320 31684 ?        Sl   16:43   0:00 update-notifier
ariel        2818  0.0  0.1 171400  6412 ?        Ssl  16:43   0:00 /usr/libexec/gvfsd-metadata
ariel        3555  0.0  0.1 171632  6372 ?        Sl   16:52   0:00 /usr/libexec/ibus-engine-simple
root        10991  0.0  0.0      0     0 ?        I<   17:09   0:00 [xfsalloc]
root        10992  0.0  0.0      0     0 ?        I<   17:09   0:00 [xfs_mru_cache]
root        10996  0.0  0.0      0     0 ?        S    17:09   0:00 [jfsIO]
root        10997  0.0  0.0      0     0 ?        S    17:09   0:00 [jfsCommit]
root        10998  0.0  0.0      0     0 ?        S    17:09   0:00 [jfsCommit]
root        10999  0.0  0.0      0     0 ?        S    17:09   0:00 [jfsSync]
root        22368  0.0  0.0      0     0 ?        I    17:40   0:00 [kworker/u256:1-events_unbound]
root        22425  0.1  0.0      0     0 ?        I    17:43   0:01 [kworker/0:2-events]
root        22460  0.0  0.0      0     0 ?        I    17:48   0:00 [kworker/u256:0-btrfs-worker]
ariel       22506  1.3  1.3 750520 52344 ?        Rsl  17:54   0:06 /usr/libexec/gnome-terminal-server
ariel       22512  0.0  0.1  19824  5364 pts/0    Ss+  17:54   0:00 bash
root        22525  0.0  0.0      0     0 ?        I    17:54   0:00 [kworker/0:3-events]
root        22528  0.1  0.0      0     0 ?        I    17:54   0:00 [kworker/1:4-events]
root        22529  0.0  0.0      0     0 ?        I    17:54   0:00 [kworker/1:5-cgroup_destroy]
ariel       22554  0.3  1.5 829620 60484 ?        Sl   17:55   0:01 /usr/bin/gedit --gapplication-service
root        22561  0.0  0.0      0     0 ?        I    17:55   0:00 [kworker/u256:3-events_power_efficient]
ariel       22584  0.0  0.1  19824  5292 pts/1    Ss   17:58   0:00 bash
ariel       22625  0.0  0.0  20632  3756 pts/1    R+   18:02   0:00 ps -aux
ariel@ariel-vm:~/system-programming/ch10$
```

4. 請說明你的系統中『task_struct』到底有多大，並附上截圖證明你的說法

```
ariel@ariel-vm:~/system-programming/ch10$ sudo less /proc/slabinfo | grep task_struct
[sudo] password for ariel:
task_struct              926   1030   6016    5    8 : tunables    0    0    0 : slabdata   206   206      0
```

per object size: 6016 bytes, active_objs: 926

5. 在網路上找一張你覺得最能描述「辛棄疾」的『風景畫』。用10到20個字說明你選這張圖的理由

辛棄疾詞「激昂豪邁，風流豪放」

此圖的瀑布，從半空中猛撲下來，直搗潭心。便只用看的，就彷彿聽見水聲轟轟，似千軍吶喊，似萬馬奔騰。

也符合我讀辛棄疾的詞時，心中對詞中豪邁不羈的共鳴與感嘆。