

NSTX-U Software Support & Trajectory Discussion

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G. Tchilinguirian

Where we are now?

NSTX-U Last run 2016

- Cluster Upgraded RHEL5->RHEL6 2016
- Cluster Upgraded RHEL6->CENTOS7 2020



Experienced SW support personnel have retired during this time

- Bill Davis
- Tom Carroll
- Kevin Ying
- Paul Henderson

Good hires in HPC over the past few years..no experience supporting Ops



How Did we get here?

NSTX-U SW has been on “life support”

- Conscious decision to not fund new hires (replacements) or do routine SW work
- Labor coverage was reduced, Research budget was reallocated
- But..Data has remained available over 99% of the time (M&RP)

What is Technical Debt?

Technical debt (also known as **design debt**^[1] or **code debt**, but can be also related to other technical endeavors) is a concept in [software development](#) that reflects the implied cost of additional rework caused by choosing an easy (limited) solution now instead of using a better approach that would take longer.^[2]

--Wikipedia



How Did we get here cont'd?

HPC going in a new (appropriate) direction

- Not prioritizing “terminal server” usage model
- Compatibility with PU hosted systems
- More advanced capabilities, (ex. GPU)
- Reduced module support
- Reduced legacy, specialized, package support
- Rapid upgrade schedule, provide close to bleeding edge

```
gchlin@gchlin-l2-~  
File Edit View Search Terminal Help  
top - 11:11:05 up 32 days, 20:06, 1 user, load average: 2.31, 2.20, 2.48  
Tasks: 328 total,   3 running, 318 sleeping,   0 stopped,   0 zombie  
CPU(s): 20.1 us,  6.0 sy,  0.0 ni, 69.6 id,  2.4 wa,  1.5 hi,  0.2 si,  0.0 st  
Mem Mem : 15244.0 total,  299.2 free,  9862.3 used,  4743.2 buff/cache  
Mem Swap:  7928.0 total,  3492.3 free,  4335.7 used,  3224.4 avail Mem  
  
gchlin@gchlin-l2-~  
ps -lax --sort=cpu --ppid=0 --ppid=0  
0053268 gchlin 20  0 6588036 412452 145556 5 61.1 2.6 40:37.04 zoom  
3497 root 20  0 2278272 83228 6848 5 47.0 0.5 3193:59 Display  
1422168 gchlin 20  0 6378068 302260 177926 5 30.6 7.3 200:21.99 gnome-ss  
1424818 gchlin 20  0 4105380 822164 162528 5 25.6 5.2 77:58.95 Web Com  
1422080 gchlin 20  -11 2596236 22564 18072 5 16.0 0.1 179:45:00 pulseaur  
1424384 gchlin 20  0 5724912 139 724080 5 6.0 5.9 603:50:07 Firefox  
4073638 gchlin 20  0 671180 36144 27140 5 5.0 0.2 0:00:03 gnome-ss  
4073558 gchlin 20  0 729092 39768 28308 5 4.7 0.2 0:00:07 gnome-ss  
1422522 gchlin 20  0 2224712 353176 297980 5 2.7 2.2 98:00:08 Awaysland  
1424730 gchlin 20  0 4801680 129 336464 5 2.3 7.8 87:32:13 Web Com  
2487 root -s1  0  0  0  0  0  1.7 0.0 99:01:09 irc144  
1424572 gchlin 20  0 3937896 713904 130888 5 1.3 4.5 62:19:42 Web Com  
1424770 gchlin 20  0 4905708 190 129796 5 1.3 0.0 0:17:40:94 Web Com  
1424794 gchlin 20  0 4449180 1984 122726 5 0.7 6.7 129:00:59 Web Com  
1424839 gchlin 20  0 4135884 709420 108812 5 0.7 4.5 158:13:02 Web Com  
1437370 gchlin 20  0 3931608 241772 79984 5 0.7 1.5 23:19:14 Web Com  
1 root 20  0 254168 8724 3528 5 0.3 0.0 9:54:10 systemd
```



What about PCS?

In Good shape:

- Monthly meetings held during the outage (with a brief pause).
- Four I&C Staff members involved in this support
 - Frank Hoffmann
 - Roman Rozenblatt
 - Chris Barber
 - Marc Sibia
- Working with Devon and Dan to develop needs list, set direction



Where do we go from here?

- New hire: NSTX-U SW support personnel
 - Job Description will be written over the next couple of weeks for a mid-level SW Engineer
- Discussions with Bill Dorland & main campus to borrow a “strike team” to aid in debt pay-down
- Stan, Devon and I have worked out a list of tasks to work on this year



Restructured Support Model

I&C Supports/Develops #0,1,2:

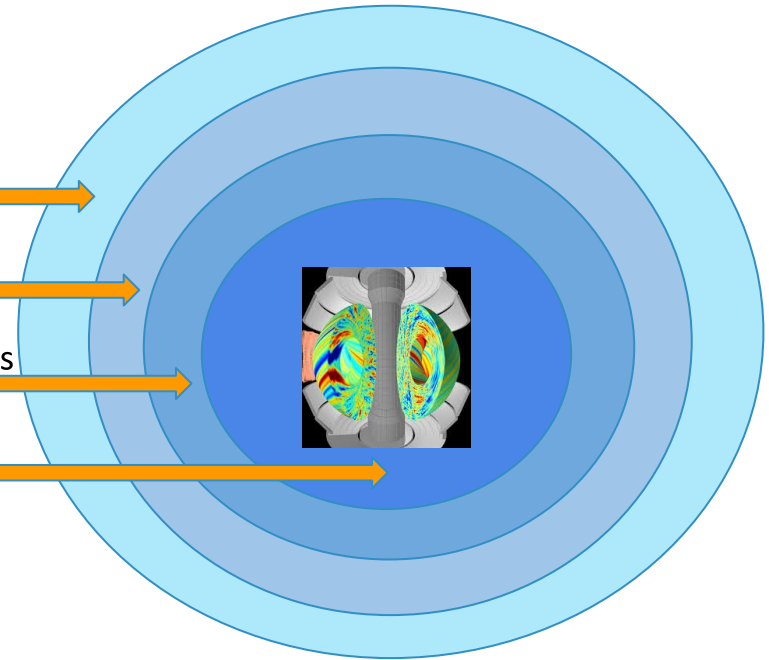


3. HPC "Theory", Async analysis tools

2. Operations sync analysis (between shots)

1. I&C Daq systems, Process Control, Key diags

0. Plasma Control System Software, R-T diags



We will maintain compatibility with #3



Proposed Architecture change:

Splinter a NSTX-U driven “mini-cluster”,

- Effectively a new nstxpool
- Prioritizes stability for operations support
 - Slower to change SW configuration
 - Upgrade policy is much less aggressive
- Configuration maintained by Ansible (I&C has been using this for its servers for 2+ years now)
- Move systems to FCC to be “closer” to most recently acquired data, camera data



Discussion Time.

Thanks for listening!

