

Lessons from 20 Continuous Years of Cray/HPC Systems

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Motivation

- **Reflect on 20 years of operation.**
- **Identify what was successful, and what wasn't.**
- **Share ideas of what was successful for us and why.**
- **Ensure that small academic centers continue being successful in the future.**
- **Share some perspective about working with a vendor for 20 years.**



Introduction to ARSC

- **HPC provider for the University of Alaska Fairbanks.**
- **Focused on meeting the HPC needs of the University's research community, including computing, storage, networking, and user support.**
- **Funded directly, and in-directly with a variety of external grants and contracts.**
- **Climate and weather modeling, ice sheet modeling, oceans physical and ecological systems, materials science and engineering.**



Arctic Cray Systems

Hostname - Model	Dates of Operation	Notes
Denali - Cray YMP	1992-1997	largest system memory in the world, for one week #251 1993/06, #302 1993/11, #405 1994/06
Yukon - Cray T3D	1994-1996	hosted by Denali #58 1994/06, #55 1994/11, #83 1995/06, #99 1995/12, #127 1996/06, #171 1996/11, #241 1997/06, #344 1997/11
Yukon - Cray T3E	1996-2003	#70 1997/06, #62 1997/11, #67 1998/06, #74 1998/11, #44 1999/06, #56 1999/11, #78 2000/06, #107 2000/11, #131 2001/06, #199 2001/11, #383 2002/06
Chilkoot - Cray J90	1998-1999	
Chilkoot - Cray SV1	2000-2003	
Rime - Cray SX6	2002-2003	located at ARSC for testing and development by Cray, ARSC, and other potential customers
Klondike - Cray X1	2003-2005	#116 2003/06, #71 2003/11, #154 2004/06, #202 2004/11, #353 2005/06
Nelchina - Cray XD1	2005-2008	additional chassis located and operated at George Washington University to support FPGA testing and development
Pingo - Cray XT5	2009-2010	#109 2008/11, #205 2009/06, #290 2009/11, #435 2010/06
Chugach - Cray XE6	2010-present	located at, then transferred to, the U.S. Army ERDC ITL for DoD open research support #83 2010/11, #100 2011/06, #142 2011/11, #236 2012/06, #230 2012/11 soon to be combined with two other DoD Cray XE6 systems
Tana - Cray XE6	2010-present	
Fish - Cray XK6	2012-present	

Small HPC Center

- **Hard to define center size, but “small” can mean budget, staffing, resource size, or data center size.**
 - **Develop “points of distinction”.**
 - **resources**
 - **staff**
 - **scientific focus**
 - **Three groups of relationships to track and maintain:**
 - **users**
 - **funding agents**
 - **vendors**
- Have good communication with all three groups in place before new opportunities arise.**

User Support

- **Academic HPC user support is an active and changing arena, but often thankless.**
- **Hire people who want to be in the position of user support instead of using it as an entry-level position.**
- **Embed users in the user support processes:**
 - **allocations reviews**
 - **advisory committees**
 - **change control reviews**
- **Look for opportunities, like acceptance testing, to provide extra resource or service to users.**
- **Get involved in tech communities and user groups.**

System Support

- **System support staff serve as the interface between the user support staff and the resources.**
- **Fundamental systems administration principles for Crays/HPCs are same as administering other info systems:**
 - **provide configuration and change management**
 - **implement and automate reliable operational procedures**
 - **create and follow appropriate policies**
 - **maintain current documentation**
- **Always be considering the next stage of a resource's life-cycle.**
- **Get involved in tech communities and user groups.**

Vendor Related

- **From a user perspective, “Cray” stands for great capacity/ capability, and carries significant cachet. From a sys admin perspective, a modern Cray is a strangely modified linux system, but still a cool reputation.**
- **Hardware vendors can be viewed as family (“the mafia”), contractors, or retailers. It’s better to be in a family than to be flying solo at the mall.**
- **Vendor support has a huge impact on system operations.**
- **Good vendor relationships lead to center success. Pick one or two vendors that provide products or services closest to primary mission and goals; develop deeper relationships with them.**

Conclusions

- **Small, academic centers have a strong role in the HPC marketplace:**
 - train and grow new staff
 - train and grow new users
 - focus on developing research projects and models
- **HPC bridging efforts rely on small centers to handle local research requirements and provide inputs (users, problems, ideas) for large centers.**
- **Small centers rely on vendors to supplement staff skills and operational procedures.**



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