

An Example Proposal

The Example

Process Migration and Internet Communications: Addressing Addressing

Process migration, moving a running process from computer without terminating the process, has a long history in operating systems research. Moving processes from machine to machine, even when it is transparent to the running process can have implications if those processes are communicating outside their local distributed system. This paper will explore the difficulties in assigning migrating processes global names that can be used in communication outside the distributed system. An example of such a system is a web server composed of multiple machines or a browser running in a Sprite[Ousterhout88] style system.

Several systems propose or implement completely transparent process migration systems, notably Sprite[Douglis91] and DEMOS/MP[Powell83]. Smith's survey of the field covers mainly such systems[Smith88] as does the excellent summary by Milojicic, et al. [Milojicic00]. These systems generally try to make migration invisible to programmer and user alike and often are part of a larger transparent systems architecture.

In the networking community, the difficulties of naming connections using the network address of the host generating the connection[Clark03][Moskowitz04] are well known. The important issue is how applications know they are talking to the same process though the network address the other end is using has changed. Though this problem also surfaces in the context of general network mobility - a computer roaming on a wireless network or a laptop moving between networks - but by making the unit of naming smaller than a machine, process migration cause it to arise in new ways and offers another place to address the problem.

This paper will examine the issues raised by process migration when in Internet communication with other remote processes. The author will consider possible process migration strategies to address the problem as well as assessing how well proposed networking solutions will work in a process migration environment. Specifically, the author will assess the utility of the HIP architecture and the ideas from the Clark paper with respect to a parallel computation and migrating interactive jobs. The architectures will be evaluated with respect to how intrusive they are to application programmers and how efficient they are in handling migration.

Bibliography

- [[Douglis91]] Fred Douglis and John Ousterhout, "Transparent Process Migration: Design Alternatives and the Sprite Implementation," *Software - Practice & Experience*, John Wiley & Sons, Inc., vol. 21, no. 8, 1991, 757-785 ,
- [Powell83] Michael L. Powell and Barton P. Miller, "Process migration in DEMOS/MP," ninth ACM symposium on Operating systems principles, ACM Press, 1983, , 110-119,
- [Smith88] Jonathan M. Smith, "A Survey of Process Migration Mechanisms," *SIGOPS Operating Systems Review*, ACM Press, vol. 22, no. 3, 1988, 28-40,
- [Milojicic00] Dejan Milojicic, Fred Douglis, Yves Paindeveine, Richard Wheeler, and Songina Zhou, "Process Migration," *ACM Computing Surveys*, ACM Press, vol. 32 , no. 3 , 2000 , 241-299 ,
- [Clark03] David D. Clark, Karen Sollins, John Wroclawski, and Ted Faber, "Addressing Reality: An Architectural Response to Real-World Demands on the Evolving Internet," ACM SIGCOMM 2003 FDNA Workshop, ACM Press, August 2003, , pp. 247-257,

[Moskowitz04] Robert Moskowitz and Pekka Nikander, *Host Identity Protocol (HIP) Architecture, RFC 4423*, May 2006,

[Ousterhout88] John K. Ousterhout, Andrew R. Cherenon, Frederick Douglass, Michael N. Nelson, and Brent B. Welch, "The Sprite Network Operating System," *IEEE Computer*, IEEE, February 1988, 23-36,