

学术研究

## 基于硬件虚拟化实现多结点单一系统映像

彭近兵+, 龙翔, 肖利民

北京航空航天大学 计算机学院, 北京 100083

收稿日期 修回日期 网络版发布日期 2008-9-18 接受日期

**摘要** 实现多结点单一系统映像SSI (Single System Image) 是并行计算机体系结构研究的一个重要方向。当前, 国内、外关于SSI的大量研究工作是在中间件层 (Middleware Level) 开展的, 存在透明性较差和性能较低等问题。提出了一种实现多结点SSI的新方法, 即利用硬件虚拟化技术, 在操作系统OS (Operating System) 之下构建分布式虚拟机监视器DVMM (Distributed Virtual Machine Monitor), DVMM由各结点之上的VMM (Virtual Machine Monitor) 共同组成, 各VMM完全对称; 通过各结点的VMM之间协作, 实现多结点系统资源的感知、整合、虚拟化和呈现, 使多结点对OS呈现为SSI; 通过DVMM与OS配合, 实现在多结点系统上透明地运行并行应用软件。同现有方法相比, 所述方法具有透明性好、性能较高、应用面广和实现难度适中优势。

**关键词** [单一系统映像](#) [虚拟化](#) [硬件虚拟化](#) [虚拟机监视器](#) [分布式虚拟机监视器](#)

分类号

## Implementing SSI for multi-node based on hardware-assisted virtualization

PENG Jinbing+, LONG Xiang, XIAO Limin

School of Computer Science & Engineering, Beihang University, Beijing 100083, China

### Abstract

It is an important direction of the development of Parallel Computer Architecture to implement Single System Image (SSI) on multi-node computer systems. Currently, most studies focus on the Middleware Level, leading to some problems of poor transparency, low performance and so on. A novel solution is presented. That is constructing Distributed Virtual Machine Monitor (DVMM) on the multi-node computer system based on the most advanced technology of hardware-assisted virtualization. SSI of the multi-node computer system is implemented through the cooperation between the DVMM on each node. Parallel Application Software can run transparently on the multi-node computer system through the cooperation between the DVMM and the Operating System which runs over the DVMM. Compared with the existing solutions, the new solution has some advantages, such as good transparency, high performance, wide usage and easy implementation.

**Key words** [Single System Image \(SSI\)](#) [virtualization](#) [hardware-assisted virtualization](#) [Virtual Machine Monitor \(VMM\)](#) [Distributed Virtual Machine Monitor \(DVMM\)](#)

DOI: 10.3778/j.issn.1673-9418.2008.05.008

通讯作者 彭近兵 [pengjinbing@les.buaa.edu.cn](mailto:pengjinbing@les.buaa.edu.cn)

### 扩展功能

#### 本文信息

- ▶ [Supporting info](#)
- ▶ [PDF\(990KB\)](#)
- ▶ [\[HTML全文\]\(0KB\)](#)
- ▶ [参考文献](#)

#### 服务与反馈

- ▶ [把本文推荐给朋友](#)
- ▶ [加入我的书架](#)
- ▶ [加入引用管理器](#)
- ▶ [复制索引](#)
- ▶ [Email Alert](#)
- ▶ [浏览反馈信息](#)

#### 相关信息

- ▶ [本刊中 包含“单一系统映像”的 相关文章](#)
- ▶ 本文作者相关文章

- [彭近兵](#)
- [龙翔](#)
- [肖利民](#)