BIOS IT

TECHNICAL ARTICLE

SUPERMICRO IPMI

What is it and what can it do for you?

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INTELLIGENT PLATFORM MANAGEMENT INTERFACE

Intelligent Platform Management Interface - (IPMI) has been around since 1998 when the specification was launched. The standard; led by Intel and has since been adopted by numerous system vendors including Supermicro.

Originally a basic set of management and monitoring tools in the first generation; there have been 2 updates since launch leading to the current revision - 2.0. These have added additional useful management features, even giving remote console access for greater administrative control.

IPMI runs on a separate hardware subsystem directly attached to a motherboard / server; either hard wired onboard or as an add-in card, this hardware is referred to as a baseboard management controller (BMC).

The BMC functions separately to the motherboard and runs its own independent software stack or firmware to the motherboard it is controlling and monitoring. This enables the administrator to connect to the BMC and control and monitor the system even if it is powered down, crashed or without any O/S.

Typical features of an IPMI BMC are as follows:

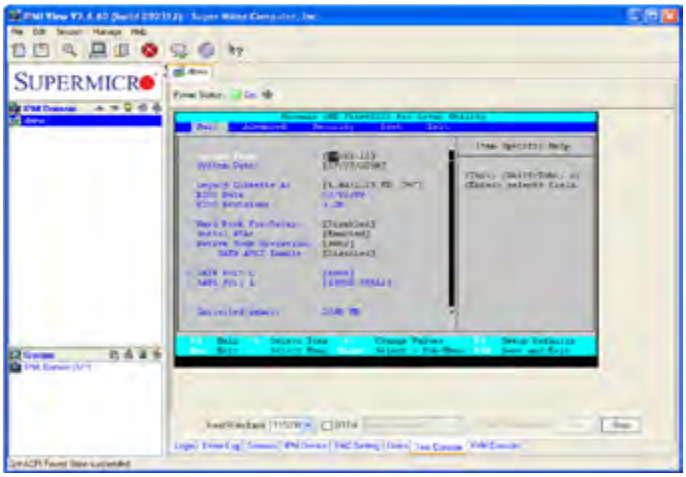
- Hardware monitoring: CPU / system temperatures, fan speeds / status, power supply status and chassis intrusion can be monitored remotely. In the event of failures or predefined thresholds being exceeded an event is logged and email notifications can be sent to an administrator for immediate action.

- Remote Power Control: Power On, Power Off, Reset & Power Cycle servers remotely. This feature is useful to control power and shut down systems when not in use. In the event of an operating system crash, it's possible to reboot a system and bring it back online. Additionally, in order to identify a system in a crowded data centre there is a UID LED which can be blinked on the front and back of the system to enable technicians to easily identify this.

- Remote Control: Serial over LAN (SOL) enables a basic text output of the screen and remote control for diagnostic and administration of CLI based applications and operating systems. This feature is often used by Linux & UNIX administrators and also by some Windows administrators via the EMS (Emergency Management Services) feature.

- FIG 1: EXAMPLE SENSOR READOUT FROM SUPERMICRO'S IPMI VIEW

- FIG 2: EXAMPLE POWER CONTROL IN SUPERMICRO'S IPMI VIEW



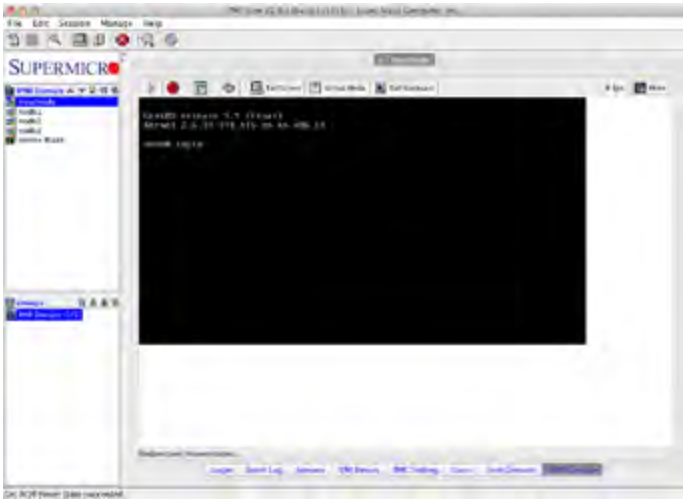
- FIG 3: EXAMPLE SOL OUTPUT FROM SUPERMICRO'S IPMI VIEW

IPMI +

You can build on these base features and create a more complete remote management solution. Supermicro for example support the following on almost all of their X8 and X9 based motherboards

- KVM over IP Support (Figure 4): Using a Java based console it's possible to gain full graphical KVM access to a system over an IP network. This allows access at all times, even before an O/S has booted, this means that you can gain access to the BIOS or DOS applications, It's even possible to perform installations of Linux and Windows remotely from this console.

- Remote Media Redirection (Figure 5): Typically integrated into the KVM over IP support this feature enables the administrator to physically attach USB storage devices to the remote controlled system. This is in the format of a local physical drive such as a USB pen drive attached to the administrators system or an image file of a DVD/CD in ISO format or even a floppy raw disk image. This means that when combined with KVM over IP O/S installs and firmware / BIOS updates are possible remotely without any need for local hands on support.



- FIG 4: EXAMPLE KVM OVER IP OUTPUT FROM SUPERMICRO'S IPMI VIEW

- FIG 5: EXAMPLE MEDIA REDIRECTION FUNCTION OF SUPERMICRO'S KVM OVER IP INTERFACE

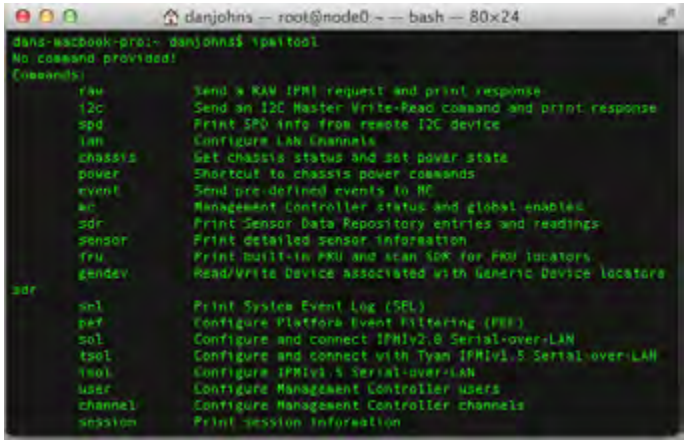
IPMI CONNECTIVITY

All these features are delivered remotely over a standard IP network port on the managed system. Most systems have both a dedicated port for IPMI traffic or if preferred it's possible to run this traffic over the 1st LAN port on the motherboard (eth0) alongside the systems standard IP traffic.

- FIG 6: THE DEDICATED IPMI LAN IS ABOVE THE USB PORTS ON THIS SUPERMICRO X8STI-F MOTHERBOARD

OPEN IPMI TOOLS

For CLI control of IPMI there are several open source clients which can be used to connect to and control IPMI BMC's. The most common example of which is the Open IPMI package; this offers excellent functionality and can be easily scripted. These tools and user guides are available to download directly from sourceforge here:
http://openipmi.sourceforge.net/



- FIG 7: EXAMPLE IPMITOOL OUTPUT WITH FEATURES

SUPERMICRO IPMI TOOL CLI

Supermicro has extended the functionality of the Open IPMI toolset with their own tool -SMCIPMI-Tool which enables support for specific Supermicro features such as controlling their blade enclosure allowing monitoring and management over IPMI.

This tool is available for download directly from Supermicro's ftp here:
ftp://ftp.supermicro.com/utility/SMCIPMItool/

SUPERMICRO WEB GUI

For casual use Supermicro provide a web GUI which is available directly on the IP address of the BMC module. This interface enables the administrator to take advantage of the full range of functions including KVM over IP and the media redirection using a Java applet without the requirement to install or load additional software.

FIG 8: EXAMPLE OF SUPERMICRO'S IPMI WEB INTERFACE SHOWING SENSOR READOUTS

SUPERMICRO IPMI VIEW

For managing groups of systems Supermicro provide a Java tool called IPMI View which runs on a variety of platforms. It enables an administrator to keep track of multiple IPMI sessions and if required perform operations on groups of systems with a few simple clicks. IPMI View can be downloaded from the following location: ftp://ftp.supermicro.com/utility/IPMIView/

INITIAL IPMI CONFIGURATION

Configuring IPMI is a simple process; the initial set-up is simply to configure an IP address with which to connect to the BMC. This is done either in the motherboard BIOS under the Advanced > IPMI Configuration > LAN Configuration tab or by using the Supermicro IPMICFG tool from your O/S.

The IPMICFG tool can be downloaded from the following location:
ftp://ftp.supermicro.com/utility/IPMICFG/

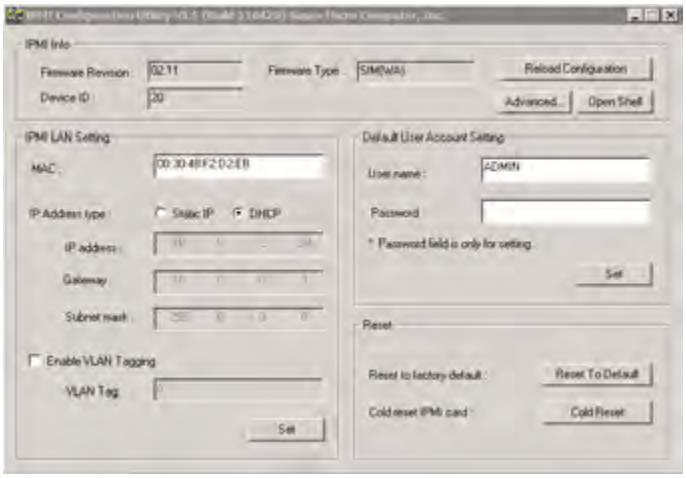


FIG 9: IPMICFG RUNNING IN WINDOW

FIG 10: IPMI CONFIGURATION IN THE MOTHERBOARD BIOS USING KVM/IP FROM MAC OSX

SECURITY

The default username and password for Supemicro's IPMI module is ADMIN in uppercase, however this should be changed immediately in any production environment to avoid any security breaches. It's possible to use local authentication and groups for varying levels or access or even connect to an LDAP or Active Directory service for authentication.

CONCLUSION

IPMI is an invaluable tool for any administrator, it enables them to monitor systems on a hardware level and perform essential maintenance remotely.

Without it system installation, trouble shooting and monitoring can be a costly time consuming experience with collocated systems â€“ a crash causing a system hang requiring a system reboot can in some situations require a trip to a data centre in another city. Simply probing the KVM to determine the fault and if necessary power cycling the node can be done in seconds resulting in a faster response time.

As all administrators know, if undiscovered, hardware failures can cause slowdown or even the complete halt of critical services. Email notifications of PSU or fan failures and changes in temperature / voltage can ensure that proactive maintenance can take place and avoid costly unscheduled downtime.

All of these factors make IPMI an excellent tool for reducing your TCO and improving your productivity as an administrator and your company's services as a whole.

ABOUT BIOS IT

BIOS IT delivers global first-to-market technology together with High Performance Computing products and techniques, previously exclusive to academia and scientific research, into the real world. With a number of key hardware and software partners, BIOS IT are able to design and develop unique and manageable compute and storage clusters with industry leading value/performance ratios.

Privately held since inception, we have grown from humble beginnings to become a global leader in enterprise information technology with over 20 years' experience. Although during this period technology architectures have evolved, our mantra for delivering high quality, first to market products and services has always been the same. This set of core values has allowed us to grow organically to a turnover of over $60million with a foot hold in the world's leading economies.

As a dedicated division, BIOS IT has then taken this innovation a step further to enable constant investment in new technologies and subsequently allowed us to design and manufacture our own HPC systems, the first of which was the micro-server Viridis platform, the world's first ARM server for the enterprise. This revolutionary architecture has enabled us to deliver supercomputing performance from as little as 5W per server, paving the way to exascale computing.

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