Autonomics: Mastering Self-Learning and Self-Healing

Expert systems can not only learn your IT environment and deeply automate the art and science of infrastructure management, but can resolve significant repetitive, SOP-based activities without human intervention.

Executive Summary

The rise of automation is driving a radical shift in the delivery of IT services. Nowhere is this more apparent than in IT infrastructure management, where companies across industries are adopting various automation solutions to reduce operational cost, enhance service levels, improve predictability and achieve infrastructure agility.

Importantly, increased automation is changing the way physical, virtual and cloud environments are managed. Outages caused by human error can have a high impact on business, and as a result companies have automated as much as possible to eradicate human errors. In fact, some companies have added penalty clauses to provider service level agreements (SLAs) to cover human-induced errors. Moreover, some companies are said to be prioritizing solutions that through self-learning, self-healing automation can continuously reduce year-over-year IT costs. In coming years, a higher percentage of technical issues will be resolved through self-healing and self-help solutions, as analysts have noted.

This white paper examines the trends in IT operations automation, the need for IT automation solutions for infrastructure management, industry-leading automation solutions and how the adoption of autonomics is carving a niche across organizations.

Trends in Automation

The automotive industry historically has been at the forefront of automation adoption and industrialized automation solutions. For example, the industry has moved from assembly line machines to robotics for vehicle manufacturing to optimize plant operations and improve time-to-market, in addition to other advantages.

Recent industry research indicates that 60% of IT budgets is spent on personnel costs, while 85% of IT management tasks are mundane and can be automated. Automating these activities can reduce operational costs dramatically. Figure 1 lists the top 10 IT operation automation priorities.

Key Challenges

Among the key IT infrastructure services challenges we see are the inability to scale and maintain higher predictability, the unavailability of services at higher quality as well as inconsistencies and variations in incident and service request response and resolution times.
With the growing attention paid to SLAs, service providers are held accountable and are hit with penalties when SLAs are not met. Human error is one of the primary reasons for noncompliance with SLAs, which makes the automation of activities based on standard operating procedures (SOPs) key to reducing cycle times and manual errors.

IT operations leaders are under constant pressure to drive down labor and personnel costs associated with routine tasks and to free up resources for more meaningful activities. As a result, CIOs are continuing to shift the IT focus from run-the-business (RTB) to change-the-business (CTB) activities to position their organizations as transformational to the business and to maximize returns on their investments. Automating mundane and SOP-driven activities can reduce RTB costs and free up capital that CIOs can then apply to transforming IT operations. As such, some CIOs need automation solutions that interoperate with their current support infrastructure to eliminate disruptions in the existing technology landscape and tooling infrastructure.

Need for Automation Solutions

Industry standard automation solutions are emerging across the IT infrastructure space. Leading examples include:

- Run-book automation (RBA) is a solution that defines, builds, orchestrates, manages and reports on workflows that support system and network operational processes. Based on scripting automation, RBA can interact with all types of infrastructure elements such as applications, databases and hardware.

- Microsoft Orchestrator (new version of Microsoft Opalis) is a workflow management solution for the data center. Orchestrator automates the creation, monitoring and deployment of resources in the environment.

- Cortex IT Process Automation (from Innovise) is a highly adaptable and intelligent tool built around a powerful real-time expert engine. Cortex provides a robust human reasoning environment and an advanced orchestration toolset.

- HP Operations Orchestration (HPOO) is a process automation solution for automating IT tasks, operations and processes supported across the entire IT environment, from the traditional data center to the cloud.

- BMC BladeLogic Automation Suite automates the management, control and enforcement of configuration changes across servers, networks, databases and applications in the traditional data center or the cloud. Key func-
Tionalities of BladeLogic Automation include orchestration, discovery and dashboard and analytics.

- CA Server Automation is an integrated data center management solution that automates the provisioning, patching and configuration of the operating system, storage, network and application components across physical, virtual and public cloud systems.

- Juniper’s network automation solutions simplify the data center by enabling automation across the full operations lifecycle — from network provisioning to management to orchestration — to streamline processes and eliminate the risk of human error.

- HP Database and Middleware Automation (DMA) enables the delivery of cloud-based services such as database as a service and platform as a service. DMA automates provisioning, patching, upgrading and migrating databases and middleware. It automates many of the high-volume, repetitive activities that database administrators (DBAs) perform.

- Autonomics-based IPcenter, from IPsoft, is the leading IT infrastructure automation solution. Autonomics provides the gamut of automation, covering task, workload, application release, run-book, process and patch release. What differentiates autonomies from other solutions is its innovative use of artificial intelligence, expert systems and machine-learning concepts and applications.

**Reference Architecture**

Figure 2 depicts a reference architecture using IPsoft autonomies that includes automation and e-bonding connectivity. IPmon will map customer environment details to IPcenter. IPmon and IPPc provide access for virtual engineers via IPsec VPN. IPcenter will synchronize its ticketing system to the customer’s ticketing system through an e-bonding gateway. Virtual engineers will pick up tickets from IPcenter’s ticketing system and any update on those tickets will also be reflected in the customer’s ticketing system.

**Autonomics: Virtual Engineers**

Autonomics is the art and science of cloning the brain of a human engineer. It creates autonomies agents, called virtual engineers, that can perform tasks such as remediation, communication and process enforcement. Virtual engineers also have the ability to learn from the L2/L3 human engineers and SMEs about technical incidents.
or issues that are not already scripted in the knowledge base of the tool. Virtual engineers update resolution techniques in the knowledge base for future use. The expensive and critical L2/L3 resources are made available to do more innovative and people-focused work. Virtual engineers can improve the service team’s productivity and first-time-right rate by reducing human errors (see Figure 3).

Over time, this approach should shorten the resolution windows and process turnaround times significantly by automated resolution, thereby reducing the instances of multilevel escalations and improving first-time-right rates.

Virtual engineers are productive, efficient and enhance service levels significantly, thereby enabling greater SLA adherence due to a reduction in cycle time, improved predictability and higher availability of services – along with significant reductions in operational support costs. Virtual engineers can take care of repetitive and mundane tasks and allow human engineers to focus on innovation. Even for redundant manual tasks, the human error rate is about 10%, whereas virtual engineers’ error rate would approach 0%.

A standard end-to-end run-book procedure might take a human engineer two hours to complete, while autonomies can perform the same tasks in less than two minutes.

### Autonomies Capabilities

Virtual engineers are capable of human-like interactions to extend the capabilities of automation to escalations, approvals, notifications and critical processes. They can be tracked in real time with ticket-based, message-based interaction. Virtual engineers are smartly designed to escalate tickets intelligently based on the L2/L3 resources’ skills, workloads and past performance. Autonomies can track real-time workload and SLA management with the capability of metrics tracking for an individual virtual engineer.

IPsoft’s IPcenter platform enables the maintenance of an audit trail of virtual engineers with overseeing automation execution, controlling in-flight automation, triggering automation on demand and triaging failed automation. Autonomies offers ease of development and provides the ability to rapidly implement new, and modify existing, automation. The automation designer does not require programmatic training to implement new or modify existing automation. IPsoft has an intuitive, exhaustive list of in-built pallet diagrams. An engineer just needs to drag and drop to create automation design. This is critical to realize quicker ROI for automation services.

Out-of-the-box, ready-to-use automation libraries exist, encompassing IT services provided by third parties including network, storage, system,
database, middleware and commercial enterprise and custom applications. Automation libraries expedite the rapid deployment and reuse of automation, reducing the time and effort to realize results. Autonomics also supports Six-Sigma-driven business process improvement and delivery systems such as SaaS, public clouds and private clouds. Autonomics also support a depth and breadth of technologies across security, application business logic, middleware, database, OS and virtualization, storage, network and voice and the service desk.

**Autonomics’ Potential Rewards**

Operational benefits that can be achieved through the proper use of autonomics include those in the chart below (based on IPsoft customers’ experience and our ticket analysis for pilot customers):

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<tr>
<th>Benefit</th>
<th>Details</th>
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<tr>
<td>Cost Reduction</td>
<td>• Reduction of operational support costs on average by 30% to 35%. IT avoidance of unnecessary automation software licensing costs.</td>
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<tr>
<td>Service Level Enhancement</td>
<td>• Dramatic enhancement of service level and improvement in SLAs with reductions in cycle times.</td>
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<tr>
<td>Improved Predictability and Availability</td>
<td>• Significant improvement in application service availability. Significant improvement (approximately 60%) in mean time to resolution (MTTR).</td>
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<tr>
<td>Services Scalability</td>
<td>• Unlimited scaling of virtual engineers for automating repetitive and mundane tasks; freeing expensive and critical resources for innovative and people-focused work.</td>
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<tr>
<td>Flexibility</td>
<td>• Interoperability with current support infrastructure and investments.</td>
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**Looking Ahead**

Autonomics is a proven technology and a leading solution for L1/L2 automation. Companies across industries have adopted autonomics to attain better service level, operational cost reduction and delivery excellence. In fact, Gartner named IPsoft as one of the cool vendors in IT operations management in 2013.³

The key challenge for autonomics is the rampant process immaturity of IT organizations. Organizations need a basic level of maturity in their process management practices before they can leverage and realize the full potential of autonomics. How to make use of staff freed up after automating service operations poses another challenge, one that requires comprehensive planning to reskill and redeploy resources around higher value operations. Organizations that have attained a reasonable level of maturity with scale — those with run-books and process documents in place and ample tasks ready for automation — are best positioned to leverage autonomics to automate L1/L2 activities and experience quicker ROI.

**Footnotes**


3. Gartner Report - Cool Vendors in IT Operations Management, by Jeffrey M. Brooks, Patricia Adams, Ronni J. Colville, Milind Govekar, Jarod Greene, Will Cappelli and Tapati Bandopadhyay; published April 18, 2013; report number G00250041. Gartner does not endorse any vendor, product or service depicted in its research publications, and does not advise technology users to select only those vendors with the highest ratings. Gartner research publications consist of the opinions of Gartner’s research organization and should not be construed as statements of fact. Gartner disclaims all warranties, expressed or implied, with respect to this research, including any warranties of merchantability or fitness for a particular purpose.
References


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