

**IBM e-business on demand**

April 2003



**Tivoli** software

**Maximizing IBM e-business on  
demand and the IBM on demand  
operating environment.**

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### **IBM e-business on demand and the IBM on demand operating environment**

e-business on demand™ is here. On demand is a state of business, a fundamental shift in the way you operate, allocate resources, structure processes and costs, and interact with partners, customers and employees to make your value chain more fluid and interwoven.

On demand e-business is defined by flexibility, unparalleled connectivity, and the ability to adapt to changes in the marketplace quickly, without a huge investment in time, money and resources. In the on demand era, you can streamline operations, lower costs, improve the quality of service you deliver to customers, partners and employees. And gain competitive advantage while driving revenue.

To achieve an on demand state of business you need an operating environment that can easily manage IT operations as one cooperative entity, and that can effectively deal with the opportunities and disruptions that influence its growth and prosperity. An on demand operating environment helps businesses large and small readily take advantage of opportunities to realize financial benefits.

A comprehensive, enabling IT infrastructure, the IBM® on demand operating environment allows a business to execute IT operations that align with its business strategy and to be responsive, focus on core competencies, benefit from variable cost structures and be resilient to external threats.

The three capabilities of the operating environment—integration, automation and virtualization—are key to unlocking the value within the IT infrastructure and applying it to solving business problems. Based on open standards, its integrated platform enables rapid deployment and integration of business applications and processes. Combined with an environment that provides true virtualization and automation of the infrastructure, the on demand operating environment enables delivery of IT capability on demand.

Evolving to an on demand environment requires a simple and easy approach to acquiring capabilities, addressing key requirements following a roadmap to provide modular incremental steps to become an on demand business. Building on existing capabilities, on demand solution offerings support customers' transition to on demand.

On demand operating environment solution offerings can be categorized to address three main capabilities:

- *Integration—efficient and flexible combination of resources to optimize operations across and beyond the enterprise*
- *Virtualization—pooling IT resources for simplified access and improved usage*
- *Automation—capability to reduce the complexity of management, enabling better use of assets, improving availability and resiliency, and reducing costs based on business policies and objectives*

This brief explores how automation solutions from IBM enable companies to manage IT resources effectively, improve productivity and quality of service, speed the return on IT investments and respond to new challenges on demand.

#### **Automation: The IT essential for today's on demand age**

It's the on demand world. An on demand business requires an on demand operating environment. Automation enables businesses to achieve resiliency, efficiency, responsiveness and flexibility. Combined with the capabilities of integration and virtualization, a true on demand infrastructure becomes a reality.

*“An on demand business needs to have flexible business processes and flexible software infrastructure to enable it to interoperate seamlessly with customers, employees and partners.”<sup>1</sup>*

Customers today, in both IT and business arenas, face challenges that require automated solutions.

- *Do you manage IT based on demand policies as an end-to-end service?*
- *Are you confident your systems will not fail and can you automate actions to mitigate the impact if they do?*
- *Is your IT infrastructure protected from threat?*
- *Are you making the best use of your resources?*
- *Can you dynamically allocate resources to respond to changing business demands?*

Customers and partners must have securely available systems to meet ever-increasing demands worldwide. These same customers and partners must be able to access the right systems at the right time. These systems must not only fix problems, but proactively address potential threats before they impact the business. Businesses need to monitor and optimize performance from the end-user’s perspective and focus on customer satisfaction. Systems must be optimized to effectively manage change and react to demands both inside and outside the business. Finally, systems must have the ability to dynamically provision resources to allocate capacity as dictated by business needs.

Automated technologies are not new to IBM. IBM and its customers have been addressing automation for many years—in the 1940s with automated batch jobs, in the 1960s with automation of accounting processes and in the 1980s with automation of backup and recovery. However, automation has changed with customer needs and desires and the requirements of on demand business. In this new era, IBM continues to be at the forefront of automated technology and our customers today realize true business value from these solutions. Automation helps align IT and business for greater customer capability and return on investment.

**Levels of automation**

Although automation is not new, it has clearly evolved over time. The differences become clear when you understand what level of automation your business requires. Delivering systemwide automated environments is an evolutionary process enabled by technology, but it is ultimately implemented by each enterprise adopting these technologies and supporting processes.

			<b>Adaptive</b>	<b>Autonomic</b>
	<b>Managed</b>	<b>Predictive</b>	System monitors, correlates and takes action	Dynamic business policy-based management
<b>Basic</b>	Centralized tools, manual actions	Cross-resource correlation and guidance		
Manual analysis and problem solving				
<b>Level 1</b>	<b>Level 2</b>	<b>Level 3</b>	<b>Level 4</b>	<b>Level 5</b>

The path of fully automated computing can be described as five levels. Over the years, the levels of automation needs have grown. Take a simple example of your own home. In the early days, we automated our temperature systems to turn on or off at a specific time without regard to current temperature or presence of family members. This is automation based on a time element, not on sensing the environment.

More sophisticated systems sense the environment and respond accordingly to many different elements. In the home example, the heat or cooling system in the house turns on after sensing the temperature and taking the home's temperature.

The environment of the future can provide a greater sensitivity to respond to your activities and lifestyle. Based on the day of week you play tennis, for example, the heat could adjust to your preferences and the lights could turn on before you arrive home.

Autonomic computing provides the technology to enable information systems to be self-managing. These self-managing characteristics combine to deliver the automation required of an on demand operating environment. Autonomic technologies are the components "inside," while automation is the end result that is visible "outside" to the customer. IBM's Autonomic Computing Initiative focuses on developing the autonomic technologies that enable information systems to become self-managing with a minimum of human interaction, much like the human body's autonomic nervous system that controls key functions without conscious awareness or involvement. These technologies are implemented within IBM offerings so that customers are able to realize the value of automation, freeing them to focus on their business rather than on the technology.

In an IT environment, the basic level of automation is where a system alerts an administrator that a system is down. Enhanced automation provides capability for the administrator to view multiple systems simultaneously and for those systems to respond automatically to differing loads, threats and performance. At the most advanced levels, the administrator performs actions on the system that promote alignment of IT and business goals.

The figure on page 4 depicts the automation levels, from basic, through managed, predictive, adaptive and finally to autonomic. The basic level represents a starting point for IT infrastructures today. IT professionals manage each element independently by implementing it, monitoring it and eventually replacing it.

At the managed level, systems management technologies can be used to collect information from disparate systems onto fewer consoles, reducing the time it takes for the administrator to collect and synthesize information as the systems become more complex to operate.

In the predictive level, as new technologies are introduced that provide correlation among several elements, the infrastructure itself can begin to recognize patterns, predict the optimal response and provide advice on the course of action for the administrator.

As these technologies improve and people become more comfortable with the predictive power of this infrastructure, they can progress to the adaptive level. Here the elements can automatically take the right actions based on available information, and the knowledge of what is happening in the infrastructure.

To achieve a fully autonomic level, business policies and objectives govern the IT infrastructure. You interact with the IT environment to monitor the business processes, or alter the objectives or both.

### **The role of automation**

Now that we find ourselves in the on demand world, there are new questions. Instead of asking questions simply about users, processes and resources, customers ask about the relationships between users and processes, users and resources, and processes and resources.

**User to Resource:** When a retail customer logs on to their favorite shopping Web site, the site validates their identity, and they receive access to their personal profiles and account information, as well as the personalized choices they have made about favorite product lines or consistent purchases they might make. The service levels that might be measured here include how quickly a customer can be registered at the site and provisioned with the information and access they require to do business. Thresholds can be set

based on knowing that 99 percent of customers will leave the site if they don't receive a response within five seconds, for example.

**User to Process:** Banking IT executives must be able to measure ATM transaction performance end-to-end to fully understand the experience of customers standing at an ATM—how long did they have to wait? If they wait too long, will they walk away and go to another bank? Understanding the user experience throughout the entire transaction or business process is critical to the ability to manage that experience and optimize it based on any transaction issues. Was the delay in the ATM? In the database? In the transmission time because of slow network performance? One must understand the performance of all of these pieces to ensure customer satisfaction. Like our retail example, service level agreements might be based on the response time for the customer to complete the total transaction and set within specific parameters that say 97 percent of all transactions must be completed within that specified time.

**Process to Resource:** Typically, tax agencies must purchase computing capacity based on the requirement to handle peak loads during heavy tax filing periods of the year. In an on demand world, the tax agency would be able to dynamically allocate resources to tax filing processing when they are needed—and use that same capacity for other applications when not needed for peak loads. As utility services based on GRID computing develop, the government may simply be able to buy the computing resources it needs for the period it needs them, and then return to lower levels of capacity for the remainder of the time. Here, the tax agency might insist on a service level agreement that states that a specific amount of capacity must be available to the agency at specific times of the year and that increased capacity be made available within a specified time frame in response to unexpectedly high levels of activity—such as more users than anticipated filing electronically on a specific day.

Businesses need to manage the relationship of IT to users and users to business processes to ensure that the right users have access to the right services and applications—and make sure that unwelcome users are kept out by maintaining a highly secure environment. They must also manage the relationships of business processes and the alignment of IT systems to those processes. How do you know to address one server or storage problem versus

another if you can't view those problems within the context of your business environment? Wouldn't you rather address a pending problem in your customer-facing applications before you would an outage in an internally focused system like employee information?

Transactions flow across your enterprise that may be started by users as part of a critical business process utilizing specific IT resources—do you understand those relationships today? These dynamic relationships increasingly require the ability to virtualize your IT infrastructure—so you can dynamically respond to changing business requirements and utilize your IT resources to the fullest.

#### **The crucial automated capabilities**

To help customers progress to higher levels of automation and answer the critical questions about the relationships among users, processes and resources, IBM has created the Automation Blueprint, described in the figure on page 9. This blueprint can help customers in breaking down the tasks of implementing automation into specific capabilities that they can focus on as their business needs require.

At the base of the blueprint is the foundation—the software and system resources with native automation capabilities required for higher level automation functions. IBM solutions have a competitive advantage by offering foundation elements with this native autonomic capability. IBM offers a full portfolio of hardware and software with built-in autonomic capabilities to allow for the most advanced levels of automation. Many of these resources may be virtualized to the other capabilities and linked to business policy. To achieve the highest levels of on demand automation, resources need to be virtualized to be dynamically provisioned as business policies require.

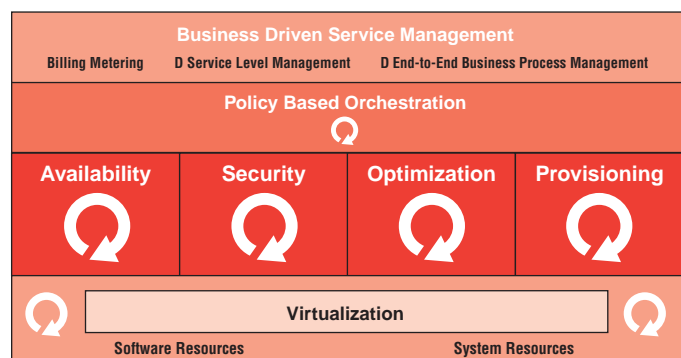
Above the resources are the four key automation capabilities. Availability helps verify that systems are available 24x7. To meet that requirement without employing huge amounts of human capital, automation can monitor your systems and automatically take actions to maintain high availability without human intervention—before issues become problems. Security keeps your systems protected from threats, provides the functions for a great user experi-



ence in accessing applications and data they need, and keep out unwelcome users. Optimization provides tools to make the most of your resources so that they run efficiently and at peak performance and provide you with an increased return on your investment. Provisioning focuses on the self-configuring, dynamic allocation of your IT infrastructure’s individual elements and provisions identities, storage or servers as business needs dictate.

The next layer, policy-based orchestration, helps the IT infrastructure respond dynamically to changing conditions according to defined business policies. This orchestrator interfaces to the IT infrastructure and provisions the resources required. Using your pre-defined business policies and priorities, the orchestrator proactively allocates the IT resources to the current business workloads.

Finally, business-driven service management capabilities provide the needed tools to manage service levels, meter system usage and bill customers for that usage, as well as model, integrate, connect, monitor and manage your business processes comprehensively for thorough linkage of IT and business processes.



 = Powered by Autonomic Computing

**IBM automation offerings: comprehensive solutions you can deploy today**

Although some technology providers have succeeded in offering part of the overall solution, IBM provides solutions that are neither based on hardware nor software. Our comprehensive solutions leverage existing resources and lay the groundwork for true autonomic computing. IBM automation offerings can be introduced into an existing infrastructure over time, working agnostically with disparate hardware components and enabling the automation of specific areas while initiating the gradual evolution to fully automated computing.

Automation solutions that adapt to existing hardware and to a dynamic IT environment represent an undisputed IBM advantage. The automation offerings described below are just a few examples of what IBM can offer to help provide powerful enterprise solutions for the development and deployment of world-class on demand applications.

**IBM Web server provisioning offering**

Automated provisioning of server hardware and software stacks streamlines IT operations. Load balancing for a Web environment improves system performance. Automatically enforces policies by dynamically adding capacity. Application health monitoring analyzes and improves performance levels, and data protection improves business continuity. Integration of the middle-ware stack into the offering. Web infrastructure monitoring drives automatic provisioning. “Agnostic” network and storage hardware requirements (subsystems and SAN). Protection against server failures and data loss; ready for integration into the rest of Tivoli systems management environment.

*Includes IBM® Director, IBM Remote Deployment Manager, IBM BladeCenter™, IBM FAStT900 Storage Server, IBM WebSphere® Application Server, IBM Tivoli® Storage Manager, the IBM Tivoli Monitoring family, IBM DB2®*

**IBM storage provisioning offering**

Helps reduce storage related downtime, improves usage through intelligent provisioning, reduces administrative workload and integrates through open standards (SMIS) for investment protection.

*Includes IBM Tivoli Storage Resource Manager, IBM TotalStorage™ Enterprise Storage Server*

**IBM user provisioning offering**

Allows Web self-service and password management, automates identity workflow process, provisions access profiles to IT resources, consistently enforces access to business resources and synchronizes identity data across resources.

*Includes IBM Tivoli Identity Manager, IBM Tivoli Access Manager, IBM Directory Integrator, IBM pSeries™, IBM xSeries™, BladeCenter*

**IBM availability management offering**

With local automated cures and business system views, IT can focus on the performance of critical business systems and transactions instead of on individual IT resources. Enables business organizations to satisfy corporate goals and meet business needs in the areas of revenue, cost management and customer satisfaction. This integrated solution yields reduced total cost of ownership and increased value.

*Includes IBM Tivoli Monitoring, IBM Tivoli Monitoring for Transaction Performance, IBM Tivoli Monitoring for Web Infrastructure, IBM Tivoli Business Systems Manager, IBM Tivoli Enterprise Console®, IBM Tivoli Storage Manager, pSeries, xSeries with Blades*

**Tivoli Autonomic Monitoring Engine**

Enables software vendors to cost effectively incorporate root cause analysis and corrective actions into their applications; enables partners to integrate best practices for autonomic computing into their applications, reduces costs of developing and testing autonomic capabilities, allows partners to focus on core competencies while leveraging best of breed autonomic capabilities, provides greater return on investment to customers and increases independent software vendor application value.

*Includes Tivoli Autonomic Monitoring Engine*

**IBM security event management offering**

Automated responses to security attacks and vulnerabilities reduce risk. Holistic automated design allows an administrator to integrate security, systems and network events. Provides centralized view of security data across organization. Pre-configured rules for best-practice event correlation.

*Includes IBM Tivoli Risk Manager, IBM Tivoli NetView®, Tivoli Enterprise Console, pSeries, BladeCenter*

#### **IBM optimization for zSeries offering**

Allows policy-based workload management and dynamic resource optimization. WebSphere workload balanced across a Sysplex cluster. Identifies problems, alerts appropriate personnel and offers a means for automated problem resolution and goal-driven automation.

*Includes IBM zSeries™ (Workload Manager, Intelligent Resource Director), Tivoli Monitoring for Web Infrastructure, WebSphere Application Server*

#### **IBM optimization for iSeries offering**

Offers a complete, highly optimized, dynamic and integrated server environment. Logical partitioning allows either scheduled or dynamic allocation of processing power between applications, resulting in high average CPU utilizations and reduced costs. Virtualized storage architecture optimizes storage for IBM OS/400, Linux and Windows environments. A broad set of e-business solutions and data center management tools enables a self-managing environment.

*Includes WebSphere Application Server, Tivoli Storage Manager, IBM Lotus® Sametime®, IBM Lotus Quickplace®, DB2 Universal Database™*

#### **The IBM Utility Management Infrastructure**

At IBM, we have defined a single roadmap, aligned with SWG, ISG and IGS, for enabling utility computing. This is important as we realize that our customers will expect choices regarding where and how they deploy as they move through their on demand journey. Key components of our on demand strategy will be delivered by IBM Global Services—including the IBM Utility Management Infrastructure (UMI). Enterprises seeking to reduce the cost and complexity of their IT environments are turning to IBM Global Services to help them design, build and operate an on demand environment. And IBM is in the early stages of implementing a utility model within its own operations leveraging the UMI.

UMI, which is built on the IBM Automation Blueprint, is an architecture and set of processes and software tools to help support the successful implementation of a utility computing model for organizations with complex e-business environments. Developed using open standards, it is designed to help companies achieve lower infrastructure and labor costs and improved levels of service quality by automating resource provisioning, improving

capacity utilization, and providing quantitative monitoring of and reporting on IT resource usage. An important step forward in our e-business on demand initiative, the UMI allows companies to begin benefiting from utility computing today by enabling them to integrate and run e-business processes and related applications on a dynamic, consolidated infrastructure.

**Automation in action**

The following example compares the potential deployment of a new business solution using a conventional process with the deployment in an automated infrastructure, incorporating autonomic technology. The enterprise used in this example needs to synchronize data with an external business partner, a familiar circumstance for the retail sector and other vertical niches in which manufacturers need to coordinate ordering, billing and delivery of their SKUs with the providers who ultimately sell the items to consumers.

In a nonautomated, nonautonomic environment, the enterprise would need to coordinate with four separate experts—a configuration expert, availability expert, performance expert and security expert—and discuss each expert’s costs.

Lower-level, non-autonomic environment		Estimated Cost	Estimated Time
<b>Service Requestor</b> "I need to implement a Data Synchronization Solution!"	<b>Configuration Expert</b> Servers, RAID, Software, Network Equipment	\$\$\$	25 Days
	<b>Availability Expert</b> Clusters, Failover Scripts, Replication Schemes	\$\$	30 Days
	<b>Performance Expert</b> Tuning, Striping, Load Balancing	\$\$	20 Days
	<b>Security Expert</b> ACLs, Credentials, Attack Signatures	\$\$	30 Days
<b>Total: \$\$\$\$ and 90 Days</b>			

Highly automated environment		Estimated Cost	Estimated Time
<b>Service Requestor</b> "I need to implement a Data Synchronization Solution!"	<b>IT Analyst</b> Resource Pools, Graphical Configuration Tool, Fabric OS	\$	2 Days
<b>Total with Automated Computing: \$ and 2 Days</b>			

- *A configuration expert installs 10 servers and operating system images, a RAID subsystem, four different middleware products, a firewall, and caching-proxy and load-balancing network equipment.*
- *An availability expert defines hardware clusters, customize failover scripts, implement a data-replication scheme and configures application-server clusters.*
- *A performance expert tunes the hardware servers, network equipment and software servers, defines the rules for load balancing within a cluster and maps logical volumes to physical disks to reduce input and output contention.*
- *A security expert writes the firewall filter rules to enforce the business's security policy, install antivirus and intrusion-detection software, updates with the latest attack signatures, exchanges security credentials with the partners and updates the authentication and authorization server.*

The possible cost: significant dollars and an implementation schedule of more than 90 days.

In an automated environment, the same solution could be deployed by a single IT analyst with greater speed.

- *An IT analyst uses the business-defined solution response time, availability requirements and current resource utilization status to determine that the requirements could be addressed by adding two blade servers and a disk pack to the existing resource pool.*
- *The analyst uses a graphical configuration tool to draw up a logical architecture and have it deployed across the physical assets.*

The cost: significantly less capital outlay and a deployment time of approximately two days. By definition, the successful implementation of an automated environment solution will be dependent on the specific environment. This example provides a helpful illustration of the potential savings of cost and days.

### How do I get started?

IBM has developed a powerful Automation Value Assessment Tool to help you on your journey to higher levels of automation. This assessment asks a series of questions focused on automation and autonomic computing to determine customer maturity in the areas of process, skills and resources. Graphical output not only determines customer maturity but also provides recommendations and possible solutions to get customers started on the road to automation. Additionally, a business value curve gives a high-level view of the overall operational efficiency improvements you may achieve over a five-year period through implementation of automated technology within your environment.

### Summary

IBM understands the real value that automation can bring to today's enterprises, the evolutionary steps required, and the need for open standards and architecture in creating a heterogeneous, autonomic operating environment. Evolving an IT infrastructure using IBM automation solutions can help companies regain their balance and respond more ably to the challenges of an on demand marketplace by dramatically reducing the cost of IT ownership and minimizing the increasing complexity of technology management.

IBM remains committed to helping you make your business an on demand business – so that you can be nimble and responsive in today's complex business environment. Automation and the productivity gains it enables can help your company do more with your resources, allowing you to redirect resources to higher productivity tasks. Additionally IBM solutions allow you to leverage thousands of person-years of IBM best practices.

IBM does all of this so that you can stay focused on your business goals and ensure your IT systems are ready for the pressures of the on demand world – the world we live in today.



### IBM software integrated solutions

IBM automation solutions support a wealth of other offerings from IBM software. IBM software solutions can give you the power to achieve your priority business and IT goals.

- *DB2*  
*Gives you the most advanced self-managing database in the world*
- *Lotus*  
*Offers the instant collaboration and communication capabilities for the on demand world*
- *Rational*  
*Provides best practices and tools for developing new software and customizing existing applications*
- *Tivoli*  
*Helps you manage the complexity of an integrated, on demand operating environment*
- *WebSphere*  
*Provides the must-have, open standards architecture for the on demand era*

### To learn more

For information about IBM automation solutions and integrated solutions from IBM, contact your IBM sales representative or visit **ibm.com**

### Tivoli software from IBM

An integral part of the comprehensive IBM e-business infrastructure solution, Tivoli technology management software helps traditional enterprises, emerging e-businesses and Internet businesses worldwide maximize their existing and future technology investments. Backed by world-class IBM services, support and research, Tivoli software provides a seamlessly integrated and flexible e-business infrastructure management solution that uses robust security to connect employees, business partners and customers.

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<sup>1</sup> Thomas Bittman and Mark Raskino. "Can IBM's 'On Demand' Strategy Build Real-Time Enterprises?" Gartner Inc., April 2, 2003.