Business Article:

Website Summary:

A SunONE Case Study Implementation
by Leon Enriquez

Focus: Case Study about Singapore's SunONE e-government initiative, including the reasons behind the system's implementation, the major challenges of implementation and current/future benefits of the system for Singapore government and citizens.

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Case Scenario
As part of the Singapore Government's off-budget measures, Prime Minister Goh Chok Tong announced the New Singapore Shares (NSS) scheme at the National Day Rally on 19 August 2001. According to the Government's media release, "The Government is giving New Singapore Shares to all adult Singapore citizens. The total cost of the NSS scheme is S$2.7 billion."

Three weeks after the official announcement, Singaporeans were able to check how many shares they were allotted online, and to encash their shares. How was this made possible in such a short timeframe?

The NSS website and e-services were successfully developed and launched by Ecquaria, a Sun iForce Solutions partner. The website was built on the Public e-Services Infrastructure (PSi) – a SunONE (Sun Open Net Environment) architecture implementation.

Initiated and led by the Singapore government with a consortium of vendors including Sun Microsystems, iPlanet, Ecquaria, and National Computer Systems – the group provided the software vision, architecture, platform, and expertise that allowed PSi to build and rapidly deploy services-on-demand, and to address the challenges that were identified. PSi was launched in February 2001 by Singapore's Ministry of Finance, and Infocomm Development Authority.

The PSi is a program initiated to enable the large-scale deployment of electronic public services through the development of a Government-wide infrastructure as part of the Singapore eGovernment Action Plan.

The value of the PSi – the Singapore Government's e-services initiative – is that it allows the different government agencies to share components which include electronic data exchange, payment gateways, authentication and other security features in the development of e-services.

PSi reduces both the incremental cost for implementation of new e-services as well as the time needed for design and development of Web services. At the same time, PSi enables retaining the flexibility to change business requirements, and offering services via multiple concurrent channels.

Backgrounder
Internet connectivity in Singapore is at an all time high with upwards of 50 percent of families in the country's population enjoying this electronic access capability. Under the IT master plan, it is the singular objective to serve the general public interest by putting together a fully integrated infrastructure for implementing an easy-to-access electronic government programme in Singapore.

The idea here is to simplify the lives of both citizens and business community. This is enabled through customer-centric electronic services (e-services). Besides fulfilling the basic expectations of enhanced efficiency, such e-services must fundamentally be of a higher quality as well as to meet the increasingly sophisticated usage demands. In essence, both citizens and businesses operating in Singapore are offered a self-service model based on a one stop services-on-demand thus reducing operational costs.

In reality, the Singapore government has an extensive and diverse online intranet operations – where the different government agencies may have over a period of time adopted different technologies and architectures to best meet their operational requirements. Obviously, such disparate, legacy systems evolved with their unique needs over time. This added to the difficulties of both implementing and streamlining new electronic services. Thus, the major challenge in implementing the new e-services infrastructure involved the need to provide a broad spectrum of new innovative services and at the same time connect to the back-end legacy systems.

Put simply, the Singapore government aimed to create a common infrastructure platform – that could provide one-stop e-services to its citizens and businesses – to achieve these goals. After studying and considering the various innovative technologies available, the vendor agnostic, Singapore government decided to go with the SunONE e-government initiative because of the perceived benefits of reliability, availability, and scalability that the integrated stack deployment offered.

Thus, the perceived payback value of the Singapore government's Public Services Infrastructure (PSi) empowered the e-services initiative. This implementation allowed the different government agencies to share components such as electronic data exchange, authentication, payment gateways, and other security features in the development of e-services.

The merits and benefits are obvious. For instance, this infrastructure (PSi) reduces the incremental cost for implementation of new e-services. In addition, it also reduces the time needed for design and development of new services. Furthermore, enhanced efficiencies include retaining the flexibility to change business requirements, and offering services via multiple concurrent channels.

Tan Swee Hua, Director, Electronic Services Division, Infocomm Development Authority of Singapore said: "We have built the PSi around a common set of tools, basically because the different government agencies and their legacy systems would present us with too many interfaces if we had to integrate all of them."

SunONE Implementation
Services-on-demand originated from the realisation that many different types of services will be delivered over electronic networks. These services include a new breed of applications that extend well beyond the tightly coupled services available today. Moreover, services-on-demand will facilitate the delivery of any time computing, any where, to anyone, using any device. Also, such services will rapidly evolve to include support for the emerging Web services and new peer-to-peer applications.

Most of the foundation software required to enable services-on-demand is available now. Yet, the ability to fully deploy Web services will require an approach to computing that is quite different from the client/server model most applications use today.

Web services are self-describing components – that can discover and engage other Web services or applications – to complete complex tasks over the Internet. Compared to the hard-wired (or tightly coupled) applications of client/server computing days, these loosely coupled software components can dynamically locate and interact with other components on the Internet to provide a service, without intervention.

In fact, these flexible software components can interact – in a new distributed computing model that extends across organisational boundaries. Thus, prospects for collaboration are enhanced as organisations and companies contemplate pairing their Web service offerings with partners to provide best-of-breed solutions to customers on-demand. At the same time, Web services highlight a new set of challenges as predictability and control are rapidly replaced by a complex Web of dynamic Internet transactions.

SunONE (Sun One Open Environment) is Sun Microsystems' vision, architecture, platform and services designed specifically to enable Web services. As a SunONE implementation, the PSi is an integrated Web services infrastructure that simplifies service delivery. This is achieved by incorporating the best practices for rapid development, deployment and easy management of Web services. The basis for such a deployment is the integrateable stack.

The PSi is capable of providing a services development tool known as the "e-service generator" for different government agencies and their vendors. What this e-service generator tool does is to enable each agency to develop e-services without re-coding. Complexity is reduced through a selection of pre-defined horizontal services as developers can do the following:
1. Define the user interface, data fields and variables;
2. Define and reuse business logic;
3. Select from the range of payment;
4. Security and/or authentication services; and
5. Electronic Data eXchange (EDX).

Recognising that the Singapore government's various agencies need to use and support a variety of service delivery styles – the services-on-demand goal of the PSi – is designed to support not only the traditional dedicated applications but other innovations such as Web applications, Web services, and even future Web services as they become available.

"To put services online is not so simple as putting up a website. We need a lot of infrastructure that people don't see," said Tan Swee Hua, Director for Electronic Services Division at IDA during an interview in 2001 with The Business Times, Singapore.

Fundamentally, this concept is the foundation for a modular, flexible, and automated access to digital assets which include computing resources from virtually anywhere. All things considered, the PSi's services-on-demand model enables better cross-business or agency integration. This essentially leads to improved cost efficiencies. This results in better return-on-investment and ultimately, better customer relationships.

To realise this goal, the software implementation vendor Ecquaria (a Sun iForce Solution Partner), has designed the PSi using SunONE technologies. Collectively, SunONE consists of the Sun Solaris Operating Environment, the Java platform and iPlanet products (including the iPlanet Application Server, the iPlanet Web Server, and the iPlanet Directory Server). These applications are powered by Sun Enterprise and workgroup servers – Sun Enterprise 10000, 4500, and 450 servers – together with the iPlanet suite of products. (Note: The entire Sun offering has since then been re-branded collectively as SunONE.)

Some of the distinct feature benefits of these fully integrated stacks include the reliability, availability and scalability (RAS) needed to bring the Singapore government's e-services vision from conceptualisation to reality. Web services is the most realistic and viable approach for companies and organisations moving towards the development and deployment of Web-based services.

Operational Issues
From a single website known as the Singapore e-Citizen portal, many of the government e-services can be accessed. When compared to waiting in a queue, this means that both Singapore citizens and businesses can derive faster and more convenient access to government services. Essentially, this meets the expectations of the populace and business community, and delivers user self-service with the simplicity of a mouse click.

With this successful implementation, more e-services from the different agencies of the Singapore government will be deployed on the PSi. Today, the capability of rapidly deploying and offering services to citizens and businesses online, anytime and anywhere is no longer fiction. For example, using the PSi, Ecquaria launched the New Singapore Shares (NSS) website and e-services for the Singapore government. With the PSi in place, the Singapore government expects to deploy more e-services within a shorter timeframe.

Panneer R. Selvan, Head of Managing for Excellence at Singapore's Ministry of Finance said: "...The infrastructure (PSi) helped to speed up the process tremendously. We are making use of the pre-programmed modules that allowed Ecquaria to come up with the e-service quickly, instead of building it from scratch."

Case Study:

In late September 2001, Ecquaria was awarded the project to develop the NSS website and e-services to enable eligible Singapore citizens to check, in real-time, their NSS allotment and instruct the Central Provident Fund Board (CPFB) to exchange their NSS for cash.

In order to meet the project deadline, Ecquaria leveraged the Public e-Services Infrastructure, a Web services-ready Singapore government services delivery infrastructure. Basically, PSi was architected for all government agencies to enable quick development, deployment, and syndication of e-services across government ministries, agencies, and businesses.

Historically, a similar execution would have taken at least six months to develop before any transactional e-government service could be rolled out successfully. In just three weeks, Ecquaria's fast deployment of the required e-services and website – to support the Singapore Government's NSS – demonstrated the effectiveness and importance of delivering services-on-demand.

The PSi provided the background infrastructure for NSS services to be made available via the Internet. The end-result enabled information-sharing, and seamless communications between the relevant government agencies involved such as the Central Provident Fund Board (CPFB). This work was achieved while adhering to specific design considerations such as the multi-tier architecture, high availability, scalability, thin-client support, platform-independence, and utilising standards-based technology.

The benefits enjoyed by the Singapore government – by adopting the services-on-demand model – through the PSi, include faster delivery of services to support government policies, increased value and productivity, as well as IT infrastructure readiness for future requirements.

With the SunONE integrateable stack model, Ecquaria was able to design and deploy the PSi on top of the iPlanet Application Server. Thus, the PSi is an integrated Web services infrastructure that simplifies service delivery by incorporating the best practices for rapid development, deployment, and easy management of Web services.

A service development tool known as the "e-service generator" enabled different government agencies (and their vendors) to develop e-services without the need for software re-coding or coding from scratch. Through a selection of predefined horizontal services, software developers can define the user interface, data fields and variables, define and reuse business logic, and select from a range of payment, security and/or authentication services and Electronic Data eXchange (EDX) using the e-service generator.

The PSi is powered by Sun Enterprise and workgroup servers such as Sun Enterprise 10000 and 4500 servers – which provided the massive scalability, high availability, and robustness needed to support such Web services on a 24 x7 basis.

The vitality of these infrastructure success factors was highlighted – when Ecquaria launched the NSS website and e-services – in anticipation of the expected workload and transactions generated by the Internet-savvy populace.

"We intend to be one of the best e-governments in the world with innovative and efficient delivery of high quality services to the public, private and people sectors in the new digital economy." (Source: Infocomm Development Authority of Singapore, quoted in a report by The Business Times on 21 May 2001)

Box Story 1:

NSS – SunONE Implementation

Organisation: Singapore Government

Description: New Singapore Shares (NSS)

Vertical: Government

Requirements:
♦ Web services or e-services applications built on SunONE (Sun Open Net Environment) to deliver services-on-demand;
♦ SunONE product suite: Sun Solaris Operating Environment, Java technology, iPlanet Application Server, iPlanet Web Server, iPlanet Directory Server; Sun Enterprise and workgroup Servers including Enterprise 10000, 4500, 450 servers, Sun StorEdge products.

Business Challenges:
♦ Provide Singaporeans with a convenient way to check share allotment in real-time;
♦ Launch e-services program within three weeks turnaround time;
♦ Reduce queues and paperwork for counter staff on the day of the New Singapore Shares (NSS) launch; and
♦ Integrate with back-end systems to publish existing information and data online.

Business Benefits:
♦ Launched e-services within three weeks;
♦ Reduced counter queues and paperwork; and
♦ Allows quick changes to meet business requirements.

Alliance Partner: Ecquaria, a Web services infrastructure and solutions company.

Box Story 2:

PSi – SunONE Implementation

Organisation: Singapore Government, Ministry of Finance

Description: Public e-Services Infrastructure (PSi)

Vertical: Government

Requirements:
SunONE product suite: Sun Solaris Operating Environment, Java technology, iPlanet Application Server, iPlanet Web Server, iPlanet Directory Server; Sun Enterprise and workgroup servers including Enterprise 10000, 4500, 450 servers, Sun StorEdge products; and Sun Professional Services.

Business Challenges:
- Enable the large-scale deployment of electronic public services through the development of a government-wide infrastructure;
- Electronically unite agencies and their disparate systems and applications; and
- Provide one-stop services-on-demand to Singapore's businesses and citizens via the Internet and multiple channels.

Business Benefits:
- Singapore citizens and businesses can obtain faster, more convenient access to government services;
- Fast, efficient and cost-effective implementation of e-services;
- Singapore recognised as an "innovative leader" (according to a recent report on global e-government; along with Canada and United States); and
- With the PSi in place, the Singapore government expects to deploy more e-services within a shorter timeframe.

Alliance Partners: Ecquaria, and National Computer Systems.

Box Story 3:

PSi – Singapore eGovernment Action Plan

The Singapore eGovernment Action Plan maps its vision is to be a leading eGovernment to better serve the nation in the digital economy. To achieve this objective, the Singapore government has set aside S$1.5 billion for InfoComm technology initiatives in the public sector up to the year 2003.

As part of this action plan, a project called the Public eServices Infrastructure (PSi) was initiated to enable the large-scale deployment of electronic public services through the development of a government-wide infrastructure. The PSi, an e-services initiative, is an example of a SunONE (Sun Open Net Environment) implementation which is based on an open, integrateable stack designed to create and deploy services-on-demand.

The value of the PSi is that it allows the different government agencies to share components such as electronic data exchange, payment gateways, authentication and other security features in the development of e-services. This reduces both the incremental cost for implementation of new e-services as well as the time needed for design and development. PSi retains the flexibility to change business requirements in services easily, and can offer services via multiple concurrent channels.

This common infrastructure platform was jointly developed by the Singapore government together with a consortium vendors including Sun Microsystems, iPlanet, Ecquaria (a Singapore-based Web services infrastructure and solutions company), and National Computer Systems (a Singapore-based systems integrator).

As a testimony to the successful implementation of the PSi, IDA received The Explorer Award at a premier E-GOV 2002 event held in Washington, DC, USA, in June 2002.

Tan Swee Hua, Director, Electronic Services Division, IDA said: "We are indeed honoured to be one of the few non-US entities to win the distinguished award. The Explorer Award adds a new milestone to Singapore's e-government initiative. It demonstrates our success and commitment in empowering the public to make their lives more convenient by transforming the manner in which the government transacts and delivers services."

The Explorer Award is presented in conjunction with E-GOV 2002, a premier e-government event in the US, recognised and attended by worldwide government and industry representatives. The award honours organisations that have developed innovative e-government programmes, which increase productivity, conserve limited public resources, and improve the quality, timeliness, and accuracy of public services.

Box Story 4:
About Ecquaria

Ecquaria (a Sun iForce Solutions Partner), is one of the first companies to launch an integrated Web services platform – Ecquaria Service-Oriented Platform (Ecquaria SOP). Ecquaria SOP encompasses the best practices of service delivery and enables large organisations such as governments to deliver complex Java 2 Platform, Enterprise Edition (J2EE) applications and Web services within seven days.

Ecquaria SOP is a ready future-proof infrastructure product that allows software developers to select from ready and reusable common services such as payment, workflow and authentication via a Web Services development tool known as the Service Integration Tool, thus reducing the development time for complex applications.

Some of the company's key customers include the Singapore Government, InfoComm Development Authority of Singapore, Civil Aviation Authority of Singapore, Building and Construction Authority of Singapore, National University of Singapore and Ministry of Finance. For more information, visit the company's website at: http://www.ecquaria.com.

Box Story 5:
About NCS

National Computer Systems (NCS) is a wholly owned subsidiary of the Singapore Telecommunications Group Ltd (SingTel Group). As a leading IT service provider in the region, NCS's mission is to help customers create business value and gain competitive edge through the strategic implementation of IT.

NCS helps companies and governments re-design management processes, integrate proven technologies into existing information systems, manage information and train the staff. Its core competencies are business consulting, systems integration and development, infrastructure integration and outsourcing.

Backed regionally by a dedicated workforce, NCS is well-positioned for any business partnership to magnify business value and grow with customers. For more information, visit the company's website at: http://www.ncs.com.sg.

(Afternote: Case Study was originally commissioned by a trade publisher for a supplement project but not published in print media due to budget cutbacks.)

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