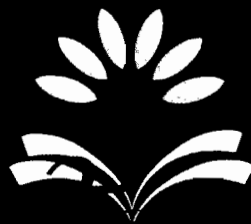




CASE STUDY ON MANAGEMENT



Mengunggulkan Wawasan dan Sejarah

**In Conjunction of
UUM's 25th Anniversary**

Research and Innovation Management Centre

CASE 3

“INFUSION-ING” THE INFORMATION TECHNOLOGY RESOURCES EFFICIENTLY

**Ku Ruhana Ku Mahamud
Faudziah Ahmad
Rafidah Abdul Razak
Nor Farzana Abd. Ghani**

The company is in the middle of structuring and organising information technology (IT) resources between the four business arms of the company, aimed at solidifying its competitive footing and preparing itself for public listing. Dedicated to be a prime promoter of the knowledge hub with distinctive emphasis in the knowledge management system, In-Fusion Solutions Sdn. Bhd. (ISSB) is now making its mark on the local on-demand knowledge delivery landscape and plans to become a public-listed company in the near future. With the growing list of clients, ISSB foresees the need of becoming more efficient, thus a Chief Information Officer (CIO) has been brought onboard to oversee IT resources efficiently in the company. Among the company's challenges are lack of powerful tools for managing product development data and too much dependency on the open source tools. On the other hand, other tools to support crucial business functions of which are located at different locations and on different platforms, such as help-desk, customer relationship management, financial management, etc. also need to be enhanced and some need to be developed. The current inter-networking infrastructure also calls for the CIO and ISSB's management attention. IT resources such as hardware and software among employee and remote access solution many increase efficiency by permitting remote users to securely access information from anywhere at anytime and this needs to be addressed urgently. Greater network capacity provides greater ability for ISSB to handle business transactions. Each of the inter-networking components generates opportunities and issues that the ISSB management must understand and be able to effectively address. In a nutshell, these issues need to be resolved as soon as possible for the company to move forward to be public listed next year and to be able to keep up with future projects in the pipeline.

BACKGROUND

In-Fusion Solution Sdn. Bhd. (ISSB) was established in 2002 by a group of four team members, Mohamad Salmi Mohd Sohod, Azini Nur Ameran, Fauzi Anuar and Mohamad Dimiyati Abdullah with the vision of optimising the technology for learning and new media. The establishment of the company was officially made when the four of them together left their previous company known as UNITAR in 2003, with a common mission of creating more accessibility to knowledge and educational opportunities via the usage of technology. ISSB's vision is to be the premier information and communication technology company providing virtual education solutions in a full converging environment. ISSB offers advanced and innovative e-learning solutions to the global community.

The company's core strength is on content and multimedia courseware development. Current activities include developing learning management systems/content management systems and student management systems through the use of open source technology. In addition, the company has linked together with Oracle to produce an education learning suite "THRICE" and has established a joint venture with Microsoft to develop "sekolahku" community portal, which aims to give an alternative to high cost tuition fees for UPSR, PMR, and SPM students. Together with MIMOS, ISSB has taken up a project to produce a new clinical learning platform based on symantic technology.

ISSB's network and systems team focused on integrating solutions, managing learning portals, data centres and IT infrastructure, while, their edutainment team focused on utilisation of 2D/3D visual and special effects to produce short series, TV series, and taking jobs for film and animated series.

Technology is used to support the education sector, edutainment, and product development and services. The team believes that technology is a great enabler for their services and is the source of income to the company. For example, they have used technology to establish K-Force programs and software for their finance and human resource.

With the strategic alliances with renowned IT vendors, ISSB aspires to deliver the best solution which meets their clients' expectation and gives value to their e-learning experience. The company's vision and missions are shown in Table 3.1 and 3.2 in appendix.

As an education solution and services provider, ISSB core products includes Courseware, Enterprise Resource Planning (ERP) system for the education environment, Educational games, Learning Content Management System, Student Information Management System, Integrated Campus Management System, Islamic Banking and Finance Program, Knowledge Information Exchange System, and Portal

experience. With a dedicated team professional comprising educationists, instructional designers, writers, editors, translators, creative designers, and multimedia specialists, ISSB plans to place itself at the forefront of today's society as a leading educational content company.

ISSB, being the parent company that provides investment funds and owners of the intellectual property, is supported by three business arms in order to keep up with ongoing demands from public and private clientele. The first business arm is education, which is handled by In-Fusion Education Sdn. Bhd. (IESB) and Go-Academy. The two subsidiaries provide quality post-secondary education and training covering all disciplines and levels. Several learning centres have been set up by IESB: Cyberjaya University College of Medical Sciences (CUCMS) focuses on medical, pharmacy, and allied health programmes. Go-Academy/Academy of Digital Animation and Media (ADAM) focuses on media, animation and special/visual effects. Cyberjaya International College (CIC) focuses on foundation, A-level and pre-university programmes, while K-Force focuses on online/blended learning for government ministries.

I-Systems Sdn. Bhd. (I-Sys) which handles education technology acts as a systems integrator, portal, and IT infra structure maintenance company to serve subsidiaries and external clients. It can also be seen as the production arm of the group which produces state-of-the-art e-learning solutions. I-Sys is powered by highly competent professionals who excel in learning object and software product development, infrastructure, software project and client relationship management to create a global learning infrastructure for education communities toward establishing the K-Economy. Under I-Sys, ISSB has set up a joint-venture company with India known as Fusionware Private Ltd. (FPL). FPL focuses on development projects in open source/Microsoft share points and Oracle fusion middleware application.

The third business arm is edutainment and is handled by Go-Fusion. This is a multimedia content provider that concentrates on design, development, and delivery of learning content. In addition, this subsidiary also focuses on 2D/3D and special/visual effects products and services. The subsidiaries that handle the three business arms are presented in Table 3.3(a) through 3.3(d) in appendix.

Currently, the company conducts projects from other companies as well as outsource its own tasks to other companies. Initial proprietary solutions are provided to customers but customers usually face problems in managing their systems due to lack of technical expertise to maintain back-end systems. Thus ISSB now provides software and service solutions to assist their customers. The company has also established a strategic alliance with Ministry of Defense Malaysia (MINDEF), Microsoft, and Oracle.

In managing the current situation and future growth, ISSB has encountered and foreseen several limitations. They realised that the technology that has been developed in terms of products and services is not fully optimised. They are lacking resources to efficiently manage their current and potential developments. ISSB at the moment does not have a clear technology plan that will ensure sustainability of human capital development and also business growth. In terms of future prospects, ISSB has a bright future. The company has good opportunities in grabbing potential major projects due to the "connection" of the founders with some clients and previous business engagements with UNITAR in providing online learning projects. In addition, ISSB is also an early adopter of open source/Java technology and has great experience in producing multimedia content for e-learning projects.

ISSB'S HISTORY OF INFORMATION SYSTEM

The use of information systems (IS) in ISSB started off in the financial department. Its function is to store and process staff financial data. Later, two other information systems were been developed to manage two core business functions, namely human resource and communication. Timesheet had been developed next to replace the manual task of calculating man hours for each project. Among the systems, two have been developed by a third party, which are the financial system and recruitment system.

As the company grows, the management sees an urgency to support different departments with IS. As a result, hardware and software for each department have been purchased to assist management. This resulted in a new position in the company, Chief Information Officer (CIO). This position was created to help standardise all electronic data interfaces (EDI) between all departments so information could be managed more efficiently.

A web-based email system was developed in 2003 to facilitate the communication process between staff and external parties. However, document exchange among employees is mostly executed using Yahoo Messenger as the application has been known to provide a faster and easier digital transferring service.

As the company grows in terms of data captured, the management does not want to take the risk of losing data in case of any mishaps. As a result, backup systems were developed and implemented in 2004 to perform routine backup of product development data and the backed up data are stored at a remotely located data centre. The available systems produce daily, weekly, monthly, and yearly reports, and these reports are sufficient enough to fulfill the basic needs of the management of the company. Specifically, the existing systems are designed to cater for the middle management needs. Top management needs such as supporting decision making is not fulfilled.

MANAGING PROJECT DATA AT IN-FUSION

Just like other project developments at In-Fusion, *The Journey of Ibn Batutah*'s animated series relied heavily on the open source tools to help with the product development with the intention of minimising costs of production. This practice included managing project data, whereby ISSB deployed Relational Database Management System using MySQL tools. Azlan, the CIO, was encouraged to change this practice when he discovered that the tool was not capable of fulfilling many intended functions, let alone manage the project development data efficiently.

On top of that, after discussing with a few key employees at In-Fusion, Azlan discovered the company had employed a few unhealthy practices since the first project they embarked in. Over the years, the company religiously backed up their data every week on remotely-located servers at IDC Jaring, so that they always had two sets of backup in case of any mishaps happening on the daily backed up working data. However, the volume management still relied on individual servers and some of them were not fully utilised (see Figure 3.1 in appendix). It would not allow the company to buy storage for the entire community, but for specific server or application whenever there was a need for upgrades. In addition, this data centre does not employ real time synchronisation of back up activities.

DATA MANAGEMENT POLICY

Project development is managed by Go-Fusion, with full support from a dedicated team of content/animation developers working on their respective projects. All development projects typically followed the In-Fusion's policy of giving the staff restricted access to data related to the which project they were involved. Each staff member is granted permission to access folders certain to read and write data.

There are two types of databases namely traditional database for managing human resource and project files, and multimedia databases to manage product development data. Several servers are used to host various databases that were specifically located for each business unit (see Figure 3.2 through 3.4 in appendix).

Three workers are responsible for managing the database. However, their job scope covered every aspect of managing IT resources in the company. Since the majority of In-Fusion's employees were trained in IT, therefore it was not a big problem for them to handle the day-to-day operation of managing data. Their job scopes include maintaining not only local servers in In-Fusion itself, but also managing IDC Jaring servers. Under a Service Level Agreement between the company and IDC Jaring, the company enjoyed services such as hardware and facilities similar to any other data space provider and security mechanisms to control spamming and protect In-Fusion's intellectual property.

NETWORK ARCHITECTURE

Computing infrastructure lies at the heart of operating capabilities of the company. Without effective IT operations, the company cannot conduct business very well or for very long. Thus, managers are faced with new decisions about how underlying IT infrastructure should be designed and managed. Making wrong decisions can have severe impact on a business that relies on IT support.

The current ISSB inter-networking infrastructure is designed to accommodate the growing number of employees from only eight back in 2002 to 180 at present. Initially based in Block D in Megan Avenue II building, ISSB now has expanded its company's operation covering two new blocks at adjacent buildings (see Figure 3.5 in appendix). Block A and Block C house the majority of ISSB employees, of whom are directly involved in developing ISSB's finest products for educational and multimedia content. The networks in both blocks are equipped with Fortinet network-based firewall to stop incoming intrusions or attacks. On top of that, ISSB utilises PC Firewall that protects the employees' computer from unauthorised users gaining access to their computers through the Internet or a private network. An Asynchronous Network Interface server is also used to manage all network devices in ISSB. Maximum protection and careful network management are crucial as the product development data are kept and backed up daily at the server and employees' computer before being transferred to a data centre.

Of paramount importance for ISSB infrastructure is the remote data centre provided by Jaring. The IDC is used as a backup and recovery plan should any mishaps occur. It is protected by the Network Box, which acts as a complete Internet threat protection appliance. At present IDC houses all servers and maintains operations with high-speed Internet access 24 hours a day, all year round. However, the data centre does not store up-to-date data as the backup procedure is conducted periodically and not in real time. As a result, when a manager or someone in a different block views the progress of the current project development by accessing the IDC, inaccurate information is thus obtained.

On top of IDC, ISSB incorporates high-speed Internet access provided by TM Net, another Internet Service Provider (ISP) (see Figure 3.5 in appendix). Thus through the services provided by both ISPs, namely Jaring and TM Net, the backup activity is smoothly conducted using the Symmetric Digital Subscriber Line (SDSL). SDSL is used because it is the most ideal technology to support ISSB business operation.

UTILISING THE INTER-NETWORKING

In order to have a highly functional, reliable and stable IT infrastructure, the tasks of designing and maintaining the infrastructure are thus crucial. The solution to have

remote access, such as moving business activities to the web, could save time and money. This not only removes time-consuming activities, but also eliminates costly manual intervention.

ISSB employees are connected to each other using wired and wireless technology. In order to keep up with the growing number of employees, a decentralised approach in networking is adopted for managing ISSB's hardware and software components. In terms of network design, each block has its own Local Area Network (LAN) and the LANs are interconnected through the Internet. Each LAN consists of one or more switches linked to each other. It is also connected to a Dlink router and SDSL modem for Internet access (see Figure 3.5 in appendix). Each block also manages its own IT resources (i.e. hardware and software components) and each employee maintains the IT facilities on their own regularly.

Besides focusing on having an efficient IT infrastructure, ISSB also sees its employees as an important component and has initiated the development of Knowledge Sharing Exchange System (KIX). KIX is a platform for employees to share their knowledge and information among their peers. The system was meant for ISSB to have a better control of its employees' knowledge and information. With the availability of the high speed Internet and good network facility, the management is optimistic on the success of KIX. However, to their astonishment, the implementation turned out to be a failure.

FUTURE PLANS

Having completed several successful big projects, the project development team felt that they needed to have a unified control of storage under a single interface and also be able to preserve the legacy data in the future, as IDC Jaring could only support the keeping of legacy data for seven years. Azlan anticipated that ISSB needs to consolidate their data and upgrade the storage management for them to keep up with future projects in the pipeline.

The company is in dire need to have tools that could support the data management of various business functions that are currently located at different locations and on different platforms. Azlan believed that the company needs powerful platform and data management tools which could provide more features than the current MySQL tool. In addition, the new tool should provide more security for future project data, in order to help secure the company's intellectual property.

With more projects coming in, ISSB forecasts an increase in growth rate and market share in the years to come. Thus, to sustain business performance, a comprehensive network plan is required. A new network blueprint has been produced. For example

ISSB plans to have zero network downtime and employees can have access via their network at anytime and anywhere. In addition, the network needs to be flexible to meet the dynamic business needs and conditions. Ease of use is a must characteristic as this will allow not only current employees, but also new employees to use any system without much training. Management tools such as project monitoring, work schedules, daily employee activity tracking are essential as these tools can facilitate management in presenting variety of information, especially when urgently needed.

With the support of current ISSB's network facility, this architecture will leverage the possibilities of Storage Area Network SAN providing true storage consolidation. SAN together with the existing server, operating system, and software enhancements will allow better management of consolidated data.

Another plan being formulated for the future is to move volume management out of the individual server and onto a Storage Area Network SAN. Essentially, SAN connects a data storage that is dedicated to an application together through a high-speed network. This enables all applications to have access to all disks and enables reallocation of excess capacity to the applications that need it. SAN also unifies control of storage under a single interface, allows future storage for the entire community rather than for a specific server or application, and preserves investment in legacy storage devices and increases capacity utilisation (see Figure 3.6 in appendix).

ISSB is on an expansion trail and foresees itself to be public listed next year. Some criteria need to be fulfilled in order to be listed in Bursa Malaysia. The company's listing plan will be based on the capabilities of each subsidiary company, including the main, to be profitable and self sufficient through income stream showing high percentage of content, application, and IT utilisation in their core business. Therefore, ISSB is committed to constantly improve and modify products and services to remain competitive, and to keep a strong customer base. They believe that continuous improvement can be supported by the strategic use of information systems and effective management of IT resources. However, the main issue lies here is "how has information systems or IT played a role in giving value to improve the processes in the company?"

In the near future, ISSB foresees challenges in human capital development. The company is in the next stage of growth where indigenous technology and intellectual property will need to increase in value to ensure that the business will be intact. ISSB will need to increase their employees' technical capabilities with clear systems and technology path in mind. Some of the manpower will be redundant if they are not capable of reaching the desired level of thinking and competencies, and because of this, ISSB is serious in looking at other options, such as acquiring technology companies or merging with other complimentary technology companies. According to ISSB's

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Managing Director, the market challenges are still manageable if they continue to go for new markets such as life-long learning, edutainment/animation, and pursuing simple business model of purchasing products and services (e.g. pay as you see).

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Table 3.1

Company's Vision

VISION
To be the preferred global company recognised for quality and innovative leading solutions.

Table 3.2

Company's Mission

MISSION
To provide cost effective, integrated, affordable, end-to-end education solutions, and edutainment content to the global learning community utilising cutting-edge technologies.

Table 3.3(a)

In-Fusion Education

In-Fusion Education Sdn Bhd (IESB)
<p>Provides quality post-secondary education and training covering all disciplines and levels. In the academic sector it offers diploma, bachelor, and master level studies. While in the training sector it includes skill-based and certificate level courses. Students and trainees come from different background, age groups and abilities. Every single programme is tailored to specific group requirements and that is the business strength of IESB – customer driven approach.</p>
<p>Business Activities:</p> <p>IESB academic and training programmes are offered through one of IESB's education platforms. Cyberjaya University College of Medical Sciences (CUCMS) was founded in-line with the Malaysian government's aspiration to further improve the healthcare of Malaysians through state-of-the-art educational technology and training in medical sciences. This would be achieved via the use of Information and Communication Technology (ICT) in health science education and cutting edge technology in medical research.</p> <p>Based in Cyberjaya, Malaysia's first truly intelligent city, CUCMS strives to be a leading medical institution in the region and a university of international standing. As part of an innovative effort in the training of futuristic doctors, pharmacists, and other healthcare providers, CUCMS will not only focus on conventional and complementary medicine, but will also incorporate the teaching of military, marine, and aviation medicine. The training provided by qualified and experienced faculty members will enable the students to be independent life-long learners and continuously creative in their thinking. In addition, CUCMS will be part of the local and global humanitarian community providing relief to the needy.</p>

Source: Retrieved from: www.in-fusion.com.my.

Table 3.3(b)

I-Sys

I-SYS is powered by highly competent professionals who excel in learning object development, software product development, infrastructure management, software project management, and client relationship management among other key capabilities required for successful implementation and maintenance of IT solutions for education institutions.

Technology: Products and services offered are:

- **Learning Management System** (“LMS”) – java enabled web application
- **Student Management System** (“SMS”) – java enabled web application
- **Content Management System** (“CMS”) – java enabled web application
- Service Oriented Architecture - **Integrated Campus Management System** (“ICMS”) – business process management and standard operating protocol concept
- **SekolahKu.Net** – the development of a comprehensive e-learning portal for schools and students
- **Virtual Library**

Design and Development of Educational and Multimedia Content:

Products and services offered are:

- **Courseware development** – interactive and innovative courseware to suit individual training need
- **Learning objects** – learning objects using multimedia technology designed for different education levels
- **‘Edutainment’** – development of technology driven education and entertainment to promote the creative ability of the learner
- **Simulated games** – development of new materials of teaching and learning

Provision of Infrastructure Services:

- **Managed Application Service Provider** – provision of service to handle all aspects of application development, hosting, maintenance, and support of servers
- **Managed Thin Client Services** – a client tablet computer for students for them to access all the software required for e-learning which is centrally hosted, maintained, serviced and processed by *i.SYS*. Student tablet computers will not require independent installation of the software
- **Managed Hosted Services** – hosting services client owned applications

Source: Retrieved from: www.in-fusion.com.my.

Table 3.3(c)

Go-Fusion

GO-FUSION

Provides a comprehensive range of multimedia content development services that blends education and entertainment including film making, animation, and visual effects to complement learning materials.

Products and services offered:

Short animated series



The project was the development of a 13 episodes of 22-minute animated series on the travels of a great Muslim traveler named Ibn Battuta in the 14th century.

Sarjana Muslim

Developed 30 episodes of Sarjana Muslim series to be shown on TV9 for the month of Ramadhan in year 2007.

In conjunction with Malaysia's 50th year of Independence, In-Fusion Solutions Sdn Bhd (ISSB) produced 31 episodes of short animation that portrays the struggle of the local heroes in gaining the Independence. animation techniques were chosen depending on the illustration and multimedia which was based on the 'edutainment' concept for the purpose of giving new methods in learning the history of the Independence.

The project is the development of stories on several prominent Muslims' prophets.

Other development:

- Developed 30 episodes of Sirah Anbiyaa' series shown on TV9 in 2006
- Warriors of Malacca

(continued)

Table 3.3(c)

Go-Fusion



In conjunction with Malaysia's 50th year of Independence, In-Fusion Solutions Sdn Bhd (ISSB) produced 31 episodes of short animation that portrays the struggle of the local heroes in gaining the Independence. Animation techniques were chosen depending on the illustration and multimedia which was based on the 'edutainment' concept for the purpose of giving new methods in learning the history of the Independence.



The project was the development of stories on several prominent Muslim prophets.

Other developments:

- Developed 30 episodes of Sirah Anbiyaa' series shown on TV9 in 2006
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Source: Retrieved from: www.in-fusion.com.my.

Table 3.3(d)

Go-Academy

GO-ACADEMY

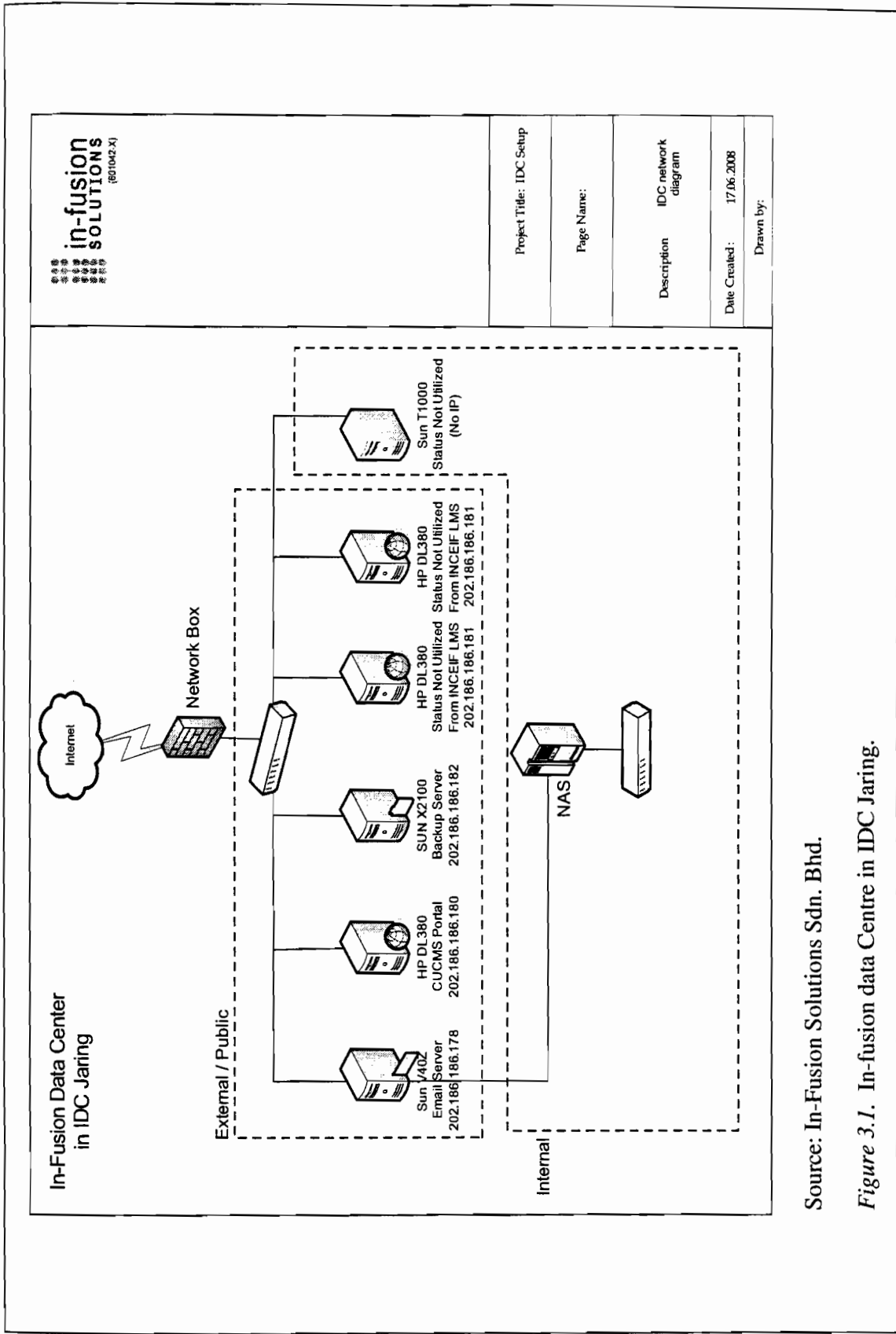
Go Academy Institute – offers Diploma in Computing, specialising in digital animation and visual effects certified by City & Guilds and MLVK.

Go Academy seeks to sustain and enhance its excellence as a New Media Education specialist through outstanding teaching so as to produce well-rounded graduates with life-long abilities.

Go Academy is dedicated to the advancement of learning through teaching and research, and to the discovery and application of knowledge. ISSB seeks to provide an environment of free and creative inquiry within which critical thinking, humane values, and practical skills are cultivated and sustained. The graduates of Go Academy will have developed a great sense of creativity and inventiveness into shaping digital animation. By weaving both the fundamentals of analogue and digital media, ISSB are determined to bring out the true artist in its graduates – one that can interact freely with technology without any limitations. Coupled with these are strong analytical, problem-solving, and critical thinking abilities; they will have excellent research and communication skills; and they will be knowledgeable, flexible, and innovative. On a wider perspective, Go Academy aims to nurture future animation gurus and lead them into a journey of self-discovery. Also to promote, educate, and help boost the animation and post-production industry.

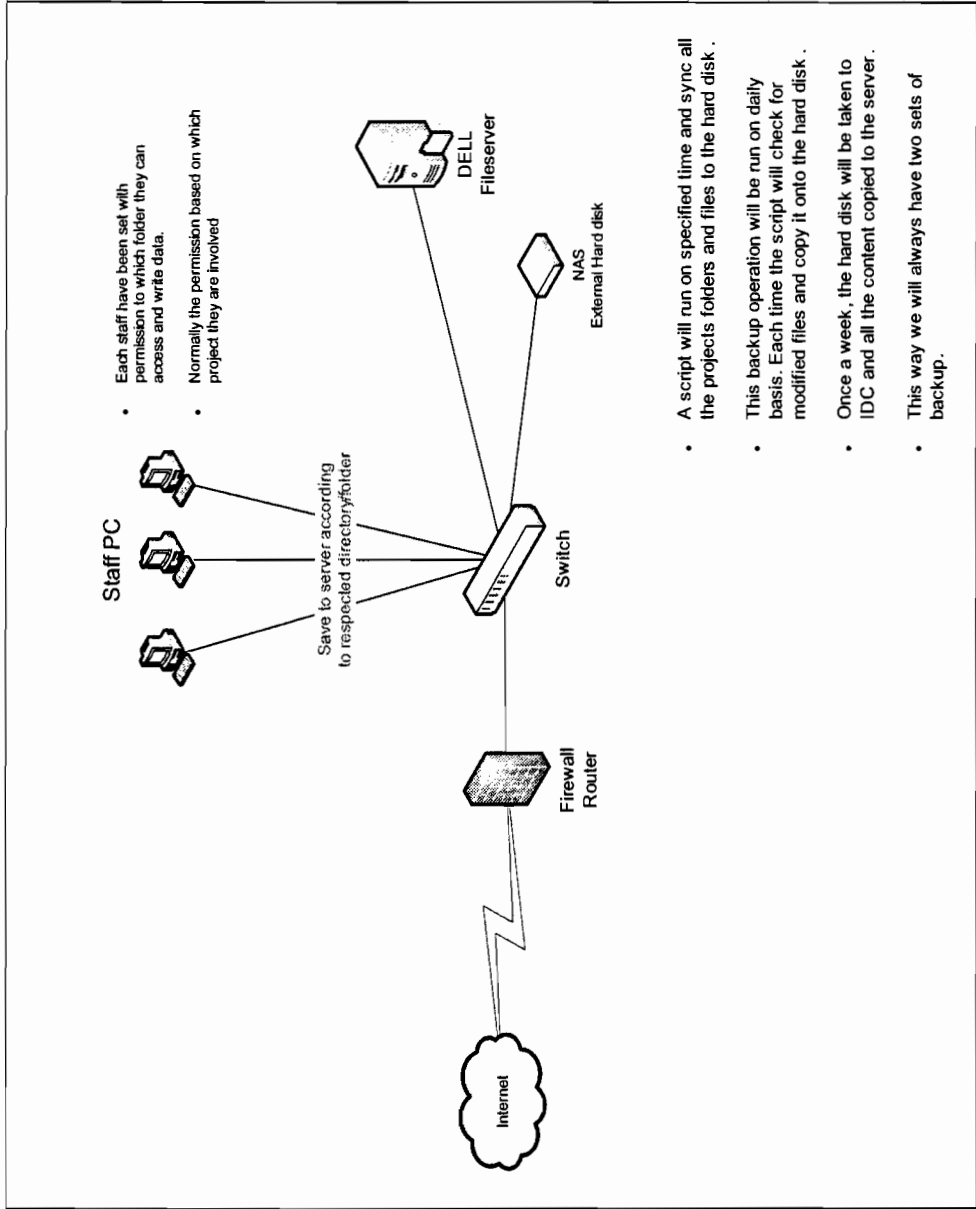
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Source: In-Fusion Solutions Sdn. Bhd.

Figure 3.1. In-fusion data Centre in IDC Jaring.



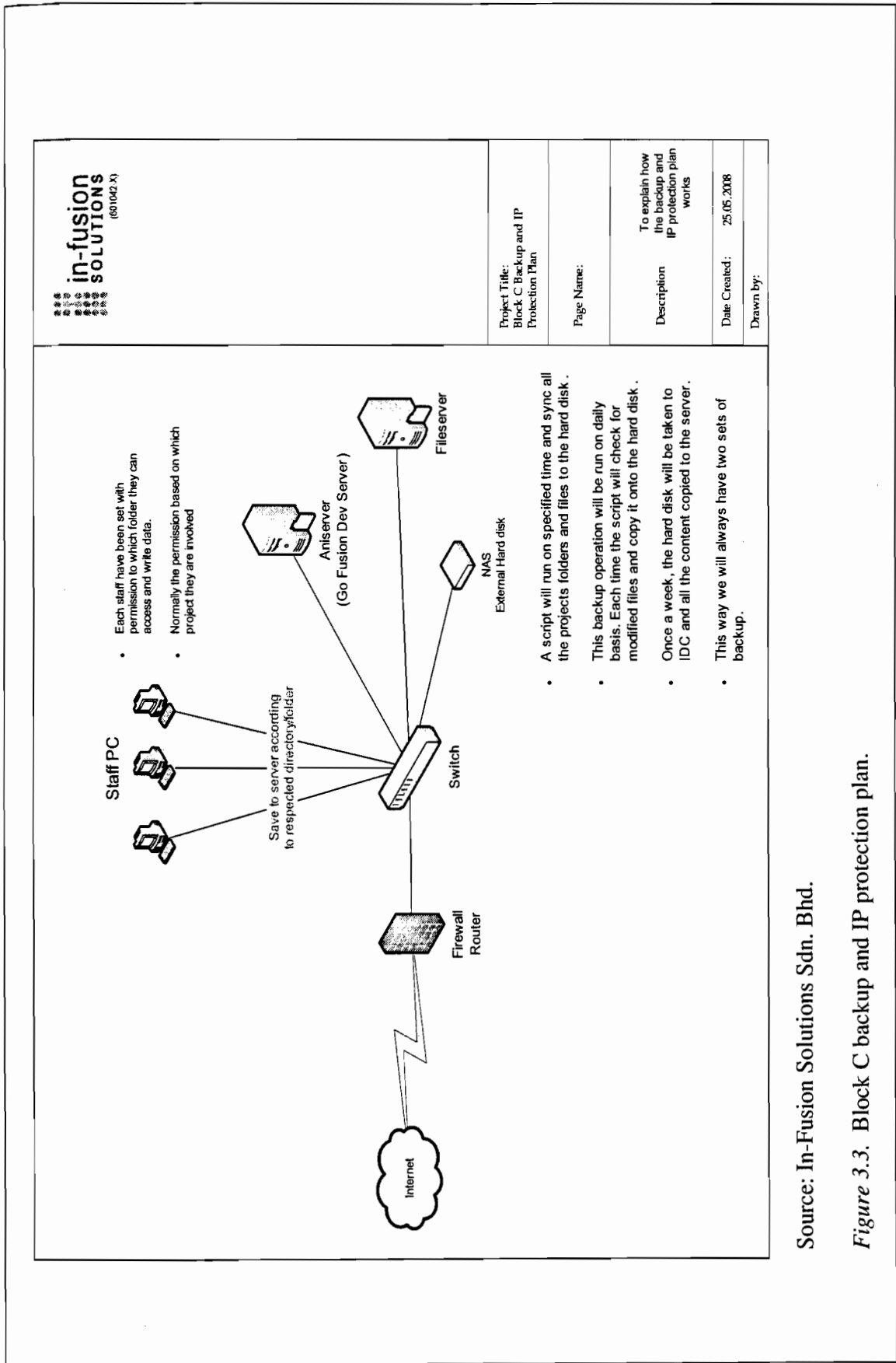
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Figure 3.2. Block A backup and IP protection plan.

Source: In-Fusion Solutions Sdn. Bhd.

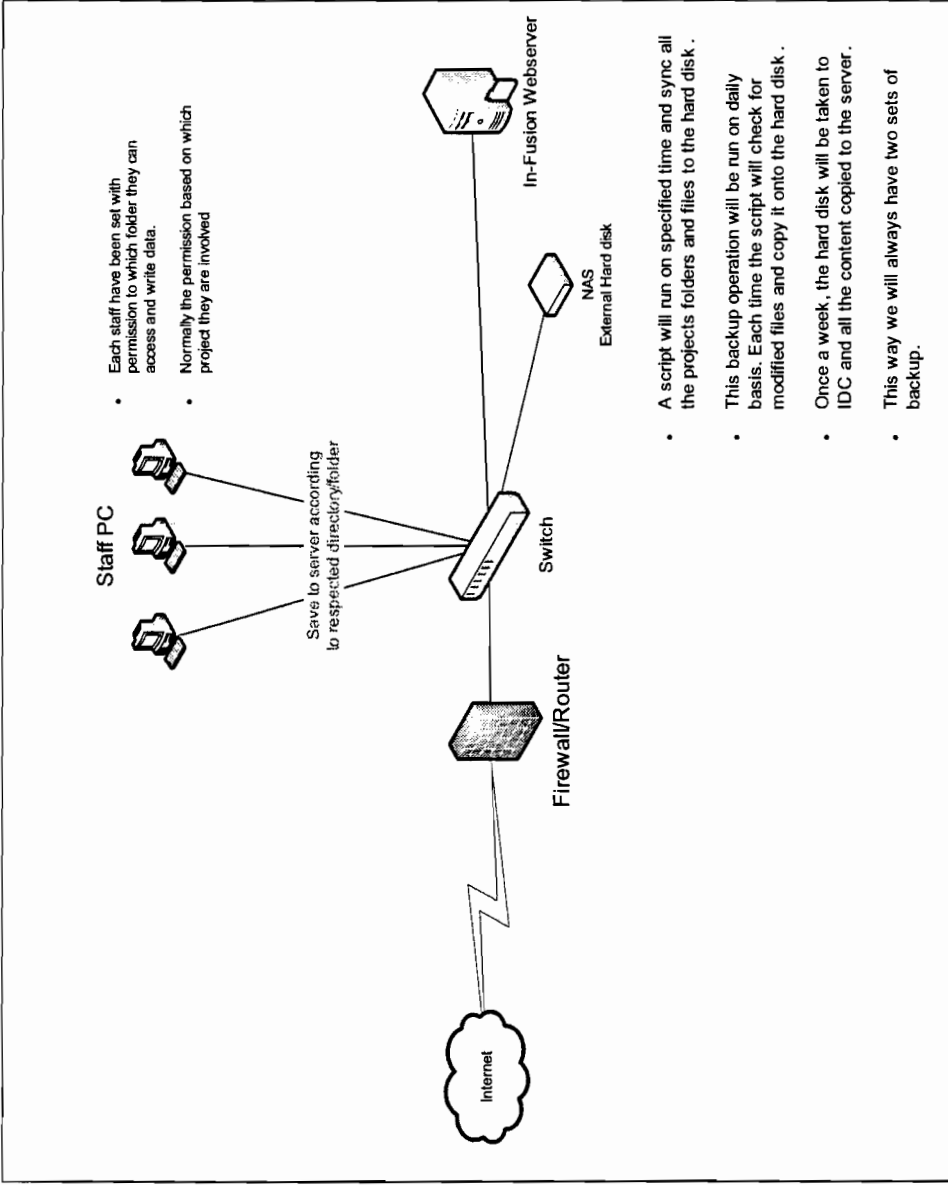
Figure 3.2. Block A backup and IP protection plan.



Source: In-Fusion Solutions Sdn. Bhd.

Figure 3.3. Block C backup and IP protection plan.

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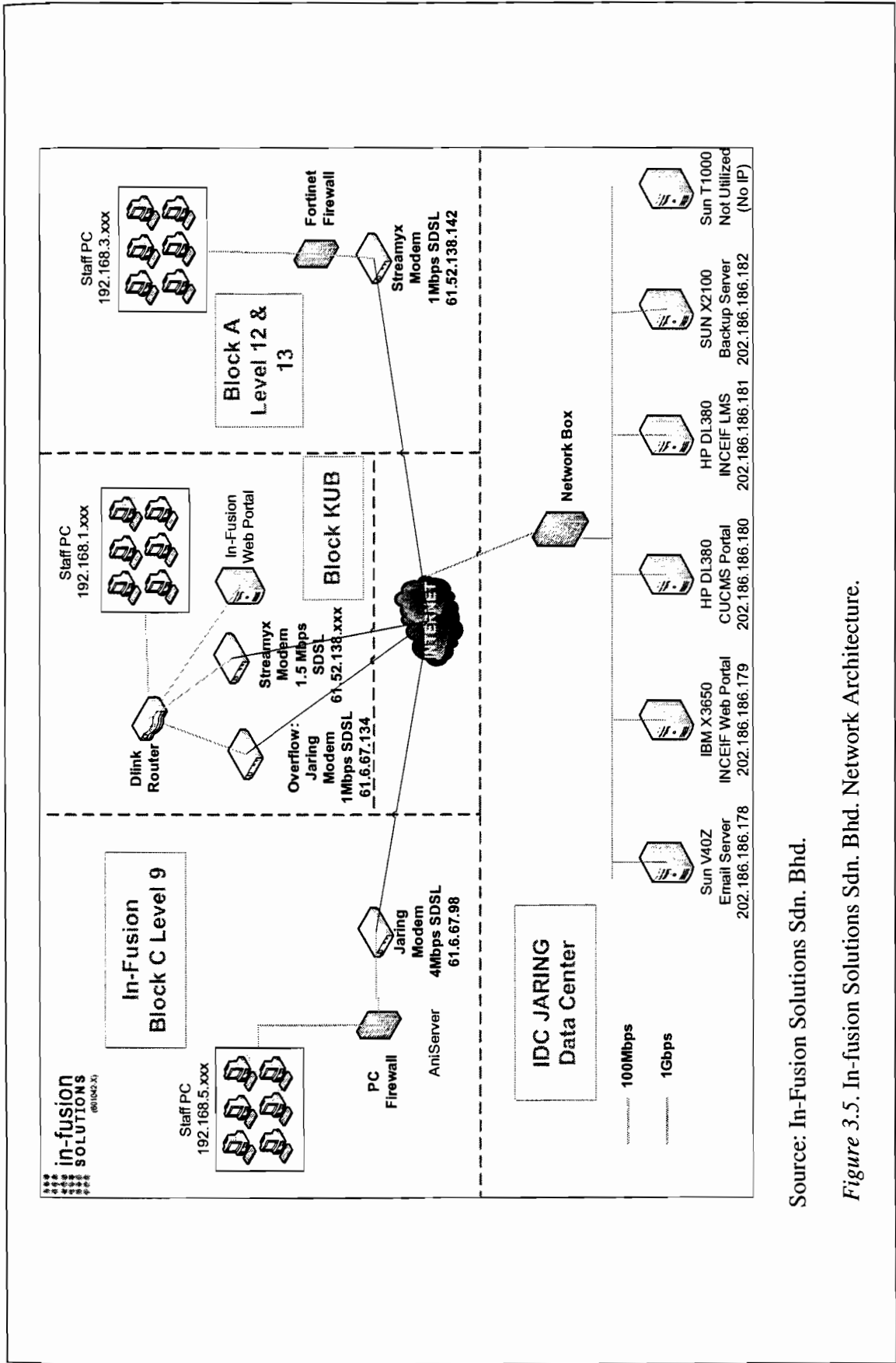


Source: In-Fusion Solutions Sdn. Bhd.

Figure 3. 4. Block D backup and IP protection plan.

Source: In-Fusion Solutions Sdn. Bhd.

Figure 3. 4. Block D backup and IP protection plan.



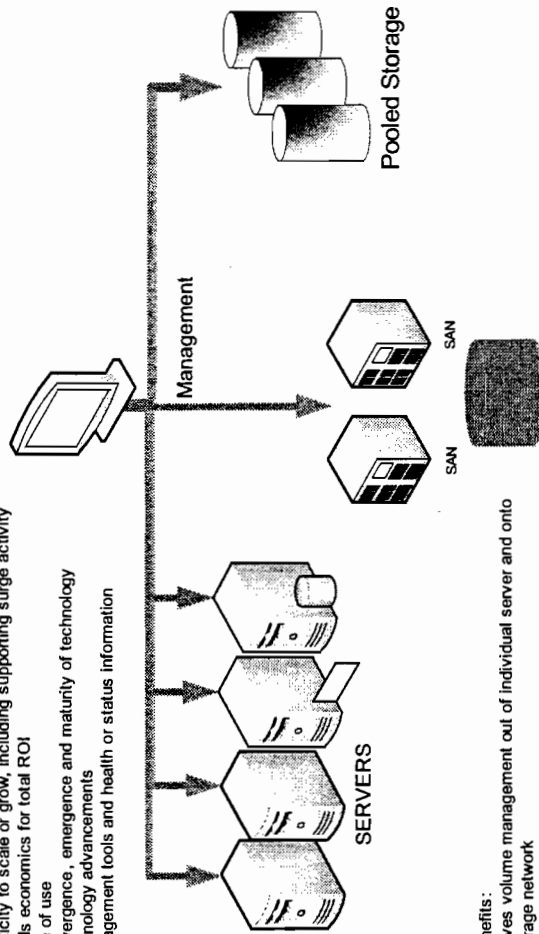
Source: In-Fusion Solutions Sdn. Bhd.

Figure 3.5. In-fusion Solutions Sdn. Bhd. Network Architecture.

**Future Plan :
Virtualization Consolidation of Management Interfaces
Pooling of Storage**

Characteristics for Future Plan:

- Always on, always-available, anywhere access
- Flexibility to meet dynamic business needs and conditions
- Elasticity to scale or grow, including supporting surge activity
- Goods economics for total ROI
- Ease of use
- Convergence, emergence and maturity of technology
- Technology advancements
- Management tools and health or status information



Benefits:

- Moves volume management out of individual server and onto storage network
- Enables reallocation of excess capacity to the applications that need it
- Unifies control of storage under single interface
- Allows In-Fusion to buy storage for the entire community rather than for a specific server or application
- Preserves investment in legacy storage devices
- Increases capacity utilization

Source: In-Fusion Solutions Sdn. Bhd.

Figure 3.6. In-Fusion Solutions Sdn. Bhd. Future Pooling of Storage.