SRI International

CANADIAN HIGH COMMISSION

SECTORAL ANALYSIS - SINGAPORE COMPUTER INDUSTRY

November 1989

SRI International
Southeast Asia & South Pacific
Regional Headquarters

Project #7895

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SECTORAL ANALYSIS - SINGAPORE
COMPUTER INDUSTRY

CONTENTS

This report covers the following topics :

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The Canadian High Commission in Singapore, Commercial Section, commissioned SRI International to prepare this sectoral analysis overview. This report is designed to help Canadian organizations meet their initial information needs regarding participation in this sector in Singapore. The information presented is believed to be accurate and from sources SRI believes to be reliable. Readers are urged to verify pertinent information before committing resources.

BACKGROUND

DIRECTIONAL EMPHASIS OF SECTOR

Information Technology (IT) has been identified as a key pillar of growth for the economic and social development of Singapore. It is considered a strategic tool by which organizations can become more efficient, productive, and internationally competitive.

Broadly defined, IT consists of all types of software and hardware used to collect, store, process, package and disseminate information. Its application are wide ranging from consumer services (eg : computerized home banking) to the use of computer-aided design (eg : manufacturing sector).

The National Computer Board (NCB) has been given the task of promoting and developing the IT industry in Singapore. It works in close coordination with other government organizations like the Economic Development Board and Singapore Telecom.

In 1986, recognition of the importance of IT led to the formulation of a National Information Technology Plan (1986) which mapped out an integrated strategy to promote the use of IT by all sectors of the economy. Subsequently a series of action programs have been drawn up and are being implemented by the NCB and other agencies. The programs include :

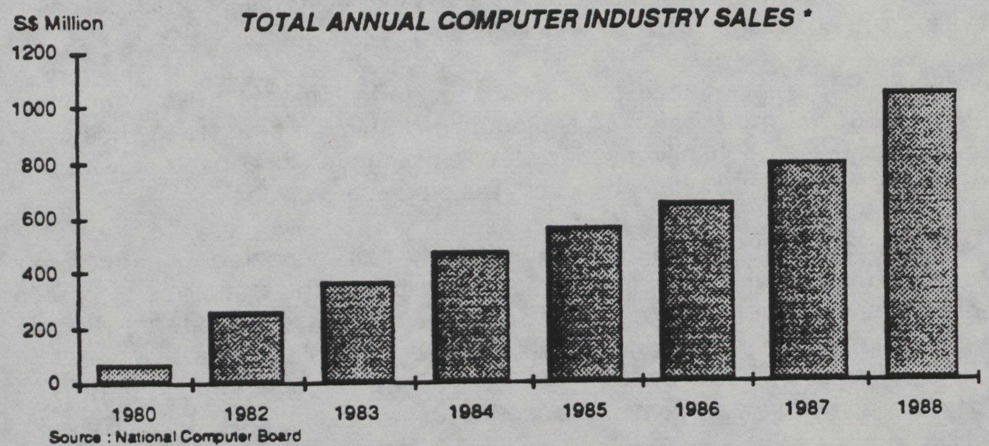
- Introduction of fiscal and financial incentives to help encourage local companies to develop hardware and software products for export. The incentives also encourage leading companies in the world to use Singapore as a base for software R&D, regional technical support and training and operational headquarters' activities.
- Expansion of civil service computerization to set an example for the private sector to emulate.
- Expansion of IT by small and medium businesses through handholding assistance, consultancy grants, soft loans, and investment allowances under a Small Enterprise Computerization Programme.
- Implementation of tradenet (an Electronic Data Interchange [EDI] network to facilitate the movement of trade documents within Singapore and eventually between Singapore and its trade parties), Medinet (an EDI network within the hospital and medical community), and Globalink (an EDI network which provides trade information for local businesses and exporters).
- Upgrading of existing infrastructure of IT manpower through better training in areas such as communications and artificial intelligence.
- Promotion of an IT "*culture*" through public awareness programs.
- Establishment of IT research and development centers to carry out innovative research in the uses of IT systems.
- Continuation of investment in the information communication infrastructure by Singapore Telecom.

The government welcomes foreign investment, particularly in areas which will help enhance existing technological, management and labor skills. Tax incentives are available to firms which invest in high technology R&D activities resulting in high-value added software services. Similar tax incentives are also given to manufacturers of computer hardware and peripherals engaged in high levels of technology transfer.

ECONOMIC OVERVIEW

The computer market in Singapore, a sub-sector of the IT market, can be categorized into two major areas : computer hardware (eg : mainframes, mini and micro computers) and computer software (eg: application software, operating system and utilities, database and management systems).

The growth of the computer industry in Singapore has been remarkable over the last few years with the sales and assimilation of computer, telecommunication, and office systems' technologies expanding rapidly. In 1988, the industry revenue stood at S$1.1 billion. This represents a more than tenfold increase from its total value of S$69 million in 1980, and an average growth rate of 40% per annum.

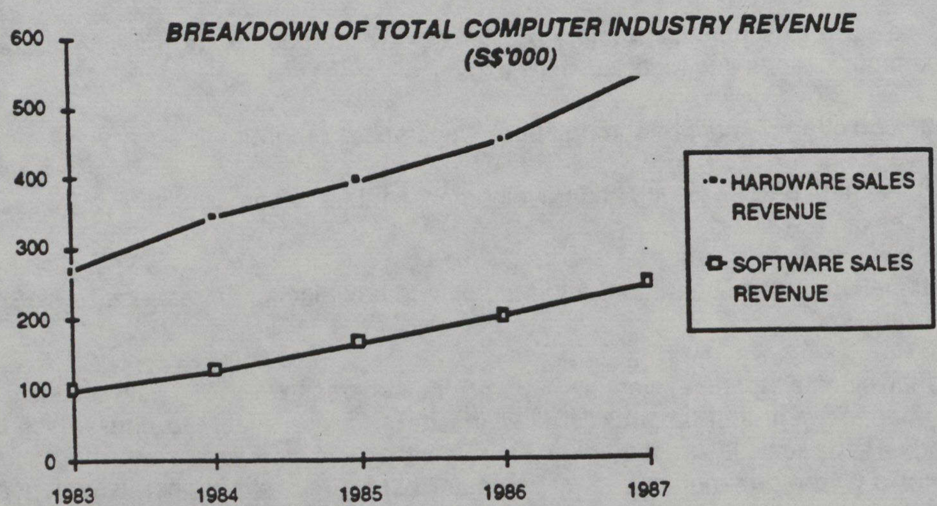


* Includes exports

CURRENT SITUATION

In 1988, the local market for computer hardware and software was estimated to be S$827 million (an increase of 35% from the 1987 level).

Total software revenue was S$257 million compared to S$570 million for that of hardware. Although higher growth rates in the software and services market have led to a decline in the share of total hardware revenue, such revenue is still 69% of total revenue.



CURRENT SITUATION ...

DEMAND FOR COMPUTER HARDWARE

The rates of expansion for mainframe, minicomputer, and microcomputer segments have been varied.

TOTAL SALES OF MAINFRAMES, MINICOMPUTERS AND MICROCOMPUTERS 1986 - 1989 (S$ MILLION)

	1988	1987	1986	1985
Mainframe	80	78	56	76
Minicomputer	205	140	129	111
Microcomputer	285	193	145	105
	------	------	------	------
	570	411	330	292

Source : National Computer Board Computer Vendor Survey, SRI Analysis

Sales of mainframe slowed down in 1988 to a rate of 3% while sales of microcomputers increased by 46% (from S$140 million in 1987 to S$154 million in 1988).

Reflecting the trend of downsizing computer platforms, between 1987-88 microcomputers continued to penetrate the market growing by 48%. Microcomputer revenues which constituted approximately 44% of total hardware revenue in 1986 also increased its share to 50% in 1988.

Technological progress in microelectronics, the trend towards networking, and the national effort in promoting IT applications among the small and medium sized enterprises have been the main causes for the strong growth in microcomputer sales.

BACKGROUND ...

CURRENT SITUATION ...

DEMAND FOR COMPUTER SOFTWARE

Sales of computer software has been growing at a faster rate than computer hardware as a result of increasing computer utilization. In fact, between 1984-1988 sales increased by 24% compared to the 20% in hardware sales.

The primary software packages of interest include application software for spreadsheet, word processing, graphics, recreational, communications, education, and general business use. There are also operating and database management system software as well as utilities software.

Since the growth of microcomputers is expected to be faster than that of the larger computers, a corresponding increase in microcomputer software and service sales is also expected.

Furthermore, because of the government's thrust to establish Singapore as a software development center, the number of software houses developing their own custom - tailored packages is expected to grow.

A significant factor influencing market growth is the recent introduction of the Copyright law which is to provide future protection of intellectual property rights and curb the problem of piracy.

APPLICATION SOFTWARE

There is clearly a high degree of usage of general application software packages in Singapore. The primary packages of interest and use include spreadsheets, wordprocessing, graphics, recreational and database packages. These standard, user-friendly packages are predominantly of US origin.

Growth areas appear to be in application software for communication and general business, and customized database management systems.

There is also a developing trend towards the use of a local area network (LAN) to interconnect personal computers (versus terminal systems network). In 1986, personal computer LAN accounted for just 46% of total worldwide shipments of LAN and terminal local networks. This share is expected to reach 72% by 1992.

COMMUNICATION SOFTWARE

The total market for communications software was estimated at US$6 million in 1987. However, with greater use of data communications facilities among IT users, as well as shift towards the data exchanges within Singapore, demand for communication software is expected to rise. This increase will be aided by the establishment of government information networks such as Tradenet and Teleview.

In the private sector, the development of more communication-based products and services such as "*tele-banking*" is expected. Such growth is expected to be encouraged by the government.

GENERAL BUSINESS

General business applications are currently focused on the following functions within organizations :

- Accounting & Finance 30%
- Sales 17%
- Purchasing/Inventory 16%
- Personnel 16%
- Administration 15%
- Production 15%

As of 1987, the market for this software was estimated at US$19 million. General business applications are implemented across all hardware types with an emphasis on the microcomputer and minicomputer in small and medium sized enterprises.

DATABASE MANAGEMENT SYSTEMS (DBMS)

As of 1987, demand for this software was estimated at US$4 million. With the new direction in the civil service computerization program of developing inter-connected systems, the use of DBMS is expected to grow. This database orientation revises the previous thrust of developing isolated computer applications in each ministry or agency.

An Intra-Government computer communications network, IDNet, has also been established to help interconnect the government's existing network of computers.

While the timeframe for the development of these systems may be protracted, a strong shift to database systems in the mainframe, minicompter and microcomputer segments of the government sector is likely in the near future. This effect is also expected to spill over to the private sector.

Major computer system projects which have been implemented or will be implemented include :

SYSTEM	ORGANIZATION	EST COST	TIMETABLE
Integrated Billing System (eg : personnel, payroll, materials, work order systems)	Singapore Telecom	S$40-60 m	Awarding of contract will be early 1990
CIMOS (Computer Integrated Marine Operation System). 3 core components (eg : Vessel Traffic Information [VTIS], Port traffic control, Computerized vessel communications system). 6 supporting components (eg : prior deployment, Marine craft, marine emergency action, ship handling simulator, hydrographic information, and real-time current monitoring systems).	PSA (Port of Singapore Authority)	S$90 m (total)	
Phase I - VTIS (Monitor vessel movement (approaching port)		S$40	Awarded to Norcontrol Surveillance System - commissioned in late 1990s
Phase II - VTIS (Monitor vessels within port - including radar system)		S$30	
Phase III - Other components of CIMOS		S$20	

BACKGROUND ...

CURRENT SITUATION ...

SYSTEM	ORGANIZATION	EST COST	TIMETABLE
Integrated Land Use System(ILUS) (centralized, up to date database on land use, buildings, other data) including GIS (Geographical Information system) software	Urban Redevelopment Authority (URA)	S$36.2 m	
Phase I - Development of 4 application systems (eg : processing of development applications cost building plan)		S$13.6 m awarded to Siemens Engineering	To be completed in 1992
Phase II - 16 Application Systems		S$22.6 m developed in-house	

CUSTOMIZED SOFTWARE *

Traditionally, the use of outside software developers has been low. Public sector organizations have contracted out less than 40% of their software requirements while the private sector contracted out 45% or more.

The growing sophistication of demands and the specialized needs of computer users is expected to develop customization demands.

* Customized software refers to software that has been developed or modified for the client before installation.

FUTURE TRENDS

The local market for computer systems is expected to experience a slowdown in its growth to below 10% over the next 3 years and less than 15% through the mid-1990s. This is because key sectors such as banking have already been tapped.

Despite the projected slowdown, market opportunities will still be available as industry sectors with high usage of computers (eg : manufacturing and trading) are expected to continue growing.

Further, of the 72,000 small and medium enterprises (SMEs) in Singapore, only about 32% of medium enterprises and 7% of small enterprises use computers. This represents a large untapped market for both hardware and software vendors.

Software and services will play an increasingly significant role in Singapore IT industry in the next 5 years, 1988-1993. During this period, market share for software and services is expected to increase from 23% to 33% of total industry revenue. This gain is expected to be at the expense of all computer hardware except mainframes.

A potential market exists for operating system software such as UNIX (which can run on all classes of computer) as well as for an operating system on OSII, IBM's latest line of personal computers.

Apart from operating systems' software, DBMS, general business applications and communications software will also experience growth. This is consistent with various government sponsored programs that are encouraging the computerization of government departments and private organizations.

In general, consumers will be demanding more user friendly software which can take on multiple tasks (eg : window software with circles multi-processing) in a screen or graphical interface like the Macintosh.

The trend towards the down sizing of computers is expected to continue resulting in higher growth rates for sales of microcomputers. A promising segment in microcomputers is the engineering work station.

Another fast developing segment of the IT industry is data communications. The LAN configuration will continue growing and linking several microcomputers in a multiuser environment. The demand for Electronic Data Interchange (EDI) Networks like the medinet, tradenet, etc, will also continue.

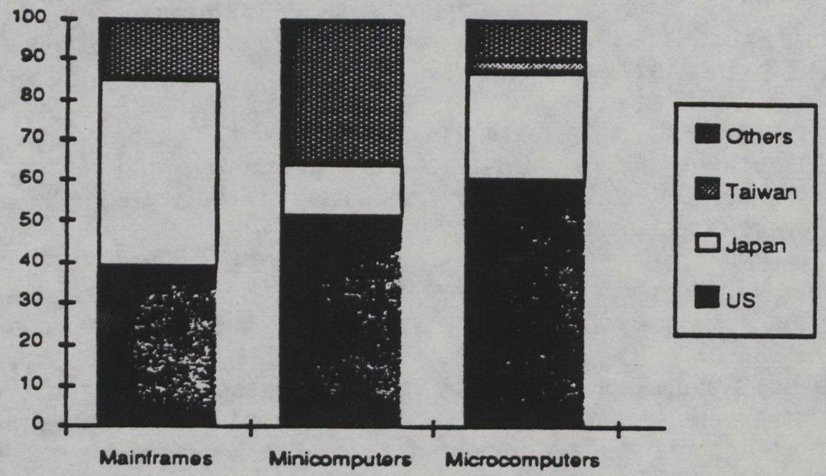
Apart from the Singapore market, regional markets such as Indonesia, Malaysia, Thailand, are expected to grow. These markets will prove attractive to niche players able to directly provide specialized and applicable services directly to industries or business groups.

COMPETITOR ANALYSIS

KEY PARTICIPANTS IN THE COMPUTER INDUSTRY

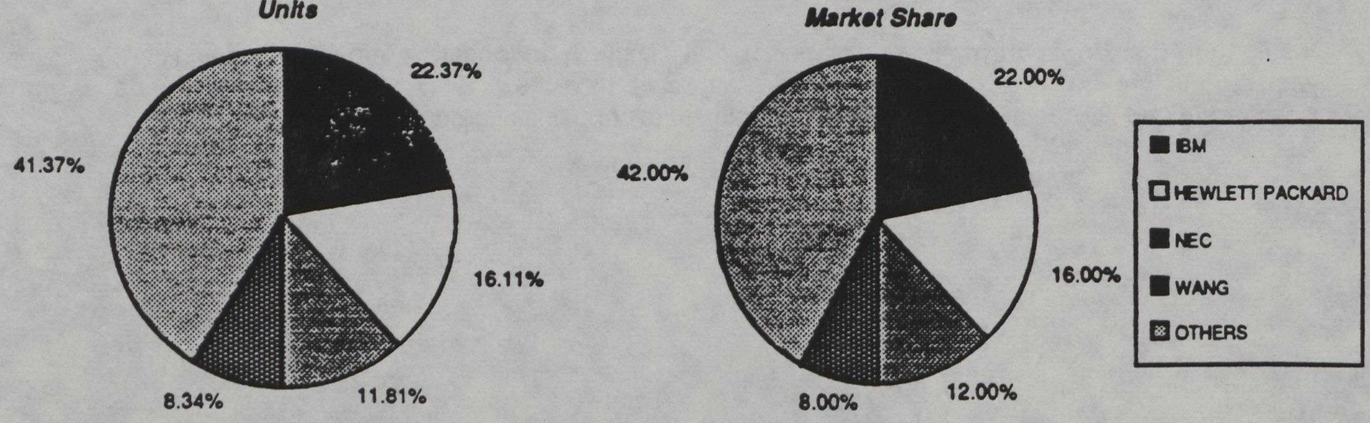
The major country suppliers of computer hardware are the US, Japan and Taiwan. In 1988, the US supplied 51% of Singapore's imports of minicomputers and 60% of microcomputers. Japan provided 46% of total imports of mainframe computers.

IMPORTS BY COUNTRY OF ORIGIN BY PLATFORM



Four computer vendors, IBM, Hewlett Packard (HP), NEC and Wang have consistently captured nearly 60% of the computer hardware market.

KEY COMPUTER HARDWARE VENDORS



COMPETITOR ANALYSIS ...

KEY PARTICIPANTS IN THE COMPUTER INDUSTRY ...

In 1988, IBM was number one in both the large and small scale categories. It was a close second to HP in the medium range.

Among microcomputers produced by local companies, Lingo and ALR are the most significant market players. They , however, have a market share of only 2% each.

The top three suppliers of computer software in Singapore are the US, Australia and Japan. Domestic suppliers are very few and largely restricted to value-added localization, customization, and installation.

The two local companies leading the software industry are ATS Computer and Computer Systems Advisors. Another local company, Far East Computers is planning to expand its operations through a joint venture with Oracle Corporation.

The current demand for Canadian computer products in Singapore is very small. The on-going changes in the market will however provide growing opportunities for Canadian companies in the near future. The leading Canadian participant is Cognos Pte Ltd which has been selling software products in Asia since 1980 through its distributor, Singapore Computer Services Pte Ltd.

They have recently set up a regional marketing office in Singapore to oversee and support their sales activities throughout Southeast Asia. Major products include data management software and software development productivity tools (4GL).

KEY CUSTOMERS IN THE SECTOR

The key customer for computer hardware is the Singapore government which accounts for 68% of total microcomputer sales. Other end-users include commercial institutions (12%), manufacturing establishments (8%), financial institutions (7%), construction services (2%) and others (5%). The major end-users for computer software are financial (30%), manufacturing (22%) and retail and wholesale institutions (22%).

CURRENT MARKETING TRENDS

The traditional means of distributing software has been through local software houses or hardware vendors. Most hardware vendors are directly present and sell both computer hardware and software. Third party vendors are either appointed dealers or distributors or an Original Equipment Manufacturer (OEM).

The use of free seminars to inform prospective customers of developments in the industry is a common means of sales promotion.

Marketing is also done through trade fairs and exhibits. One of the more recognized and supported trade shows is Informatics, sponsored by the Singapore Federation of the Computer Industry.

INDUSTRY INCENTIVES AND REGULATIONS

GOVERNMENT REGULATIONS

Imports of computer hardware and software into Singapore are free from all customs duties.

A company engaging in new fields of technological development resulting in the overall development of the IT industry may be granted pioneer status and qualify for tax incentives (inclusive of a 10 year tax holiday and an investment incentive program).

LOCAL PREFERENCE POLICY

In order to increase competitiveness and increase technology transfer, the government allows 100% foreign ownership of companies operating in this sector.

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APPENDICES
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SRI International
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KEY INDUSTRY AND GOVERNMENT CONTACTS

GOVERNMENT AGENCIES IN SINGAPORE

Economic Development Board
250 North Bridge Road
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Telex : RS 26233
Facsimile : (65) 339 6077

Trade Development Board
1 Maritime Square, #10-40 (Lobby D)
World Trade Center
Telok Blangah Road
Singapore 0409
Telephone : (65) 271 9388
Telex : RS 28617 / 28170 TRADEV
Facsimile : (65) 274 0770 / 278 2518

GOVERNMENT AGENCIES IN CANADA

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Department of Regional Industrial Expansion
235 Queen Street
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Telephone : (1-613) 995 5771
Telex : 053-4123

Department of External Affairs
125 Sussex Drive
Ottawa, Ontario
Canada, K1A OG2
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Telex : 053-3745

GENERAL BUSINESS ASSOCIATIONS

Canada - Singapore Business Association
Asia-Pacific
Foundation of Canada
2529 Kings Avenue
West Vancouver, BC
Canada, V7V 2C7
Telephone : (1-604) 684 5986

Singapore Manufacturers' Association
20 Orchard Road
SMA House
Singapore 0923
Telephone : (65) 338 8787

Canadian Business Association
c/o Private Secretarial Services
20 Bideford Road
#11-05 Wellington Building
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Telephone : (65) 734 2608

INDUSTRY ASSOCIATIONS AND AGENCIES

Singapore Federation of the Computer Industry
71 Science Park Drive
Singapore 0511
Telephone : (65) 775 1927

Singapore Computer Society
71 Science Park Drive
Singapore 0511
Telephone : (65) 778 3901

Microcomputer Traders Association of Singapore
c/o Primefield Co Pte Ltd
180 Clemenceau Avenue #07-01
Haw Par Tower
Singapore 0923
Telephone : (65) 338 8522

National Computer Board
Industry Promotion Division
71 Science Park Drive
Telephone : (65) 778 2211
Telefax : (65) 778 9641

OTHER TAX INCENTIVES ADMINISTERED BY ECONOMIC DEVELOPMENT BOARD

OTHER TAX INCENTIVES ADMINISTERED BY ECONOMIC DEVELOPMENT BOARD			
Tax Incentives	**Qualifying Activities**	**Minimum Requirements**	**Tax Concession**
• Pioneer Status			This incentive provides for complete exemption of corporate income tax. A company granted pioneer status is exempted from the 33% corporate income tax for a period of 5-10 years from the day it begins commercial production.
• Investment Allowance	Manufacturing and specialized technical servicing projects as an alternative to pioneer status.		Under the scheme, a company is granted tax exemption on a specified amount of profits equal to the approved investment allowance which is a percentage (up to a maximum of 50%) of the fixed investment in plant, machinery and equipment actually incurred by the company on the project. The amount of investment allowance to be approved will depend on the merits of the project.
• Capital Assistance			Under this scheme, industrial investors with desirable projects can obtain long term loans at concessionary interest rate.
• Operational Headquarters (OHQ)	Approved headquarters operations.	Operational Headquarters 1. should hold equity investments in companies outside of Singapore, and 2. must provide approved headquarters services to these companies from Singapore	1. Income arising from the provision in Singapore of approved services will be taxed at 10%. 2. Other income from overseas subsidiaries and associated companies may also be eligible for effective tax relief. 3. Incentive will be up to 10 years with provision for extension.
• Post-Pioneer Incentive	Approved companies enjoying pioneer status, or export incentive where the export incentive is a follow-up to the pioneer status previously awarded.	Companies must be enjoying pioneer status or export incentive on or after 1 April 1986 and should incur additional investment.	Corporate tax rate of 15% upwards for up to 5 years upon expiry of pioneer of export incentive.
• Venture Capital Incentive	Investment by eligible companies and individuals in approved new technology projects.	Companies must be 1. at least 50%owned by Singapore citizens or Singapore permanent residents, and 2. incorporated and resident in Singapore for tax purposes. Individuals must be Singapore citizens or permanent residents.	Losses incurred from the sale of shares, up to 100% of equity invested can be set off against the investors' other taxable income.

HARDWARE SUPPLIERS

Amdahl International Corporation
50 Raffles Place, #35-03
Shell Tower
Singapore 0104
Telephone : (65) 2253222
Telex : RS 22958 AMSNG
Facsimile : (65) 2242308

Apple Computer
10 Anson Road
MAS Building
Singapore 0207
Telephone : (65) 2262278

Business Computers (Pte) Ltd
11 Keppel Road #01-02 & 05-01/03
Keppel House
Singapore 0208
Telephone : (65) 2243238
Telex : RS 37161 BIZCOM
Facsimile : (65) 2252778

Chartered Electronics Industries Pte Ltd
249 Jalan Boon Lay
Singapore 2261
Telephone : (65) 6607499
Telex : RS 55992 CEIPL
Facsimile : (65) 2614913

CL Computers Pte Ltd
1 Shenton Way #08-02
Robina House
Singapore 0106
Telephone : (65) 2254800
Telex : RS 42574 CLCS
Facsimile : (65) 2245809

Compaq Asia Pte Ltd
50 Tagore Lane
Singapore 2678
Telephone : (65) 4599977

Computer Engineering Systems Pte Ltd
73 Science Park Drive #03-01/15
Singapore 0511
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Telex : RS 25223 CESPL
Facsimile : (65) 7787142

Computerage Private Limited
605A MacPherson Road #06-07
Citimac Industrial Complex
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Concurrent Computer Far East Pte Ltd
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Telex : RS 24792 CCURFE
Facsimile : (65) 3398884

Control Data Pacific Inc
200 Cantonment Road #02-09
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Telex : RS 50181 CODATA
Facsimile : (65) 2247146

Data General (S) Pte Ltd
510 Thomson Road #19-00
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Telex : RS 20220 DATGNS
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Digital Equipment Singapore Pte Ltd
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Far East Computers Pte Ltd
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HARDWARE SUPPLIERS ...

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Singapore 0410

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Facsimile	:	(65) 2788990

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HARDWARE SUPPLIERS ...

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Singapore 0106
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Telex : RS 21147
Facsimile : (65) 2234795

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203 Henderson Industrial Park
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Computer Place Services Pte Ltd
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Singapore 0207
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Telex : RS 42947 CPS
Facsimile : (65) 2254594

Computer Processing Services Pte Ltd
73 Science Park Drive, #02-14/24
Cintech Building, Singapore Science Park
Singapore 0511
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Telex : RS 20197 CPSSIN
Facsimile : (65) 7775454

Coopers & Lybrand Associates Pte Ltd
9 Penang Road #13-00
Supreme House
Singapore 0923
Telephone : (65) 3362344
Telex : RS 22137
Facsimile : (65) 3362539

Dyatron Pte Ltd
450/452 Alexandra Road
Inchcape House
Singapore 0511
Telephone : (65) 4723244
Telex : RS 21400

Econoler Singapore Pte Ltd
68 Orchard Road, #06-01
Plaza Singapura
Singapore 0923
Telephone : (65) 3363800
Telex : RS 40031
Facsimile : (65) 3361204

EDS International (S) Pte Ltd
10 Shenton Way #11-03
MAS Building
Singapore 0207
Telephone : (65) 2255466
Telex : RS 42457 EDS
Facsimile : (65) 2241667

Industrial & Offshore Computer Services (S) Pte Ltd
71 Ayer Rajah Crescent #05-23
Singapore 0513
Telephone : (65) 7795122
Telex : RS 27201 JACK

SOFTWARE & SERVICES SUPPLIERS ...

Informatics Software (S) Pte Ltd
179A Goldhill Centre
Thomson Road
Singapore 1130
Telephone : (65) 2535966
Telex : RS 20919 ISL
Facsimile : (65) 7323088

Information Engineering Services Pte Ltd
#02-180/182 Tyrwhitt Road
Singapore 0820
Telephone : (65) 2926888
Facsimile : (65) 2929677

Information Services Pte Ltd
#05-03 Natwest Center
15 McCallum Street
Singapore 0106
Telephone : (65) 2228991
Telex : RS 25445 INFOSG
Facsimile : 2225439

Infotech Consultants Pte Ltd
10 Anson Road
#13-10 International Plaza
Singapore 0207
Telephone : (65) 2253755
Telex : RS 22880 WSASEA
Facsimile : (65) 2253984

Innosys Pte Ltd
315 Alexandra Road #05-11
SPPL Building
Singapore 0315
Telephone : (65) 4727777
Telex : RS 20639
Facsimile : (65) 4732543

Jardine Logica Pte Ltd
4 Shenton Way #17-00
Shing Kwan House
Singapore 0106
Telephone : (65) 2205111
Telex : RS 24485 JARDINE
Facsimile : (65) 2246370

McCormack & Dodge (S) Pte Ltd
4 Shenton Way #19-05
Shing Kwan House
Singapore 0106
Telephone : (65) 2245522
Telex : RS 42272
Facsimile : (65) 2240604

Philips Project Development Pte Ltd
Business Systems Division
Lorong 1 Toa Payoh
Singapore 1231
Telephone : (65) 3502371
Telex : RS 21375 PHILIPS
Facsimile : (65) 2537780

Price Waterhouse Management Consultants Pte Ltd
6 Battery Road #32-00
Standard Chartered Bank Building
Singapore 0104
Telephone : (65) 2256066
Telex : RS 23039
Facsimile : (65) 2252366

SW Internation Systems Pte Ltd
Block 14 Science Park Drive, #04-01
Singapore 0511
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Scientia Computer Applications Pte Ltd
10 Anson Road #24-16A
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Singapore 0207
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Telex : RS 20326 SCISIN

Singapore Computer Systems Pte Ltd
3 Lim Teck Kim Road #09-02
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Telephone : (65) 2257555
Telex : RS 38585
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Singapore International Software Services Pte Ltd
77 Robinson Road, #14-00
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SOFTWARE & SERVICES SUPPLIERS ...

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10 Anson Road #28-11
International Plaza
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Telex : RS 42135 SPLSEA
Facsimile : (65) 2256290

SRI International
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Telex : RS 55272 SRISEA
Facsimile : (65) 5326447

Systems Access Pte Ltd
3 Shenton Way, #02-03
Shenton House
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Systems Education Centre (1983) Pte Ltd
1 Maritime Square #12-04
World Trade Centre
Singapore 0409
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Telex : RS 56955
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Systems Design Pte Ltd
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Telex : RS 38695
Facsimile : (65) 7469042