Student Investment Fund: Information Technology Recommendation

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Information Technology Sector

The Information Technology sector contributes the largest weight towards the S&P 500 ranging from approximately 26-31% of the index. It covers many industries with semiconductors, hardware, and software companies generally being the most lucrative business ventures. The sector is notable as an investment opportunity for factors including the ease for software companies to expand internationally, the popularity of U.S. based consumer hardware, and recently the boom in interest surrounding computer chips.

Diversification by Industry and Market Cap

Currently, the Student Investment Fund portfolio is largely concentrated in large-cap Information Technology companies which causes issues in optimizing diversification for our portfolio. In response to this, it would be ideal for us to consider companies in the mid-cap and small-cap ranges. Consideration of industry weightings for each market cap size was also taken into account. Within the mid-cap and small-cap sectors, software in particular contributes the greatest weight towards the total market capitalization of all of the companies in those categories; we will pay close attention particularly to companies in that industry.

Figure 1: Information Technology Shortlist of Companies Considered and Current Portfolio with Respect to Industry Weightings by Market Cap

	Industry	Market cap	fixed market cap	Weight of industry	T	Companies in portfolio
Large Cap	Communications Equipment	319151.3	319151.3	3.07%	Cisco Systems, Inc (4.33), Motorola Solutions, Inc (3.38)	
	Electronic Equipment, Instruments and Components	146312.8	146312.8	1.41%		
	IT Services	341742.4	341742.4	3.28%	International Business Machines Corporation (3.85), Cognizant Technology Solutions Corporation (3.6)	
	Semiconductors and Semiconductor Equipment	2624513.1	2624513.1	25.22%		KLA Corporation (3.85), Texas Instrument Incoparated (4.25)
	Software	4107989.3	4107989.3	39.47%		Microsoft Corporation (3.96), Intuit Inc (3.53)
	Technology Hardware, Storage and Peripherals	2867064.7	2867064.7	27.55%		Apple Inc (4.09)
Total		10406773.6	10406773.6			

	Industry	Market Cap	Fixed market Cap	Weight of industry	Ticker
Mid Cap	Communications Equipment	54854.7	33962.9	6.80%	F5 Inc (3.70), Juniper Networks Inc (3.75)
	Electronic Equipment, Instruments and Components	71578.8	73725.6	14.77%	Zebra Technologies Corporation (3.79), TD SYNNEX Corporation (3.65)
	IT Services	36985.1	44730.6	8.96%	Amdocs Limited (4.01), GoDaddy Inc (3.98)
	Semiconductors and Semiconductor Equipment	87865.7	71104.2	14.24%	Qorvo, Inc. (3.75), Amkor Technology Inc (3.50)
	Software	234110.3	237627	47.60%	Gen Digital Inc (3.86), Dolby Laboratories Inc (3.65), Qualys Inc (3.77), Dropbox Inc (3.35)
	Technology Hardware, Storage and Peripherals	21209.1	38101.4	7.63%	
Total		506603.7	499251.7		

Industry	Market Cap	Fixed market Cap	industry	Ticker
Communications Equipment	86433.2	18646.9	5.50%	
Electronic Equipment, Instruments and Components	96024.2	66909.2	19.73%	CTS Corporation (3.88), Vishay Intertechnology Inc (3.84), PC Connection Inc (3.78)
IT Services	26366.4	20525.9	6.05%	Perficient Inc (4.05), DXC Technology Company (3.59)
Semiconductors and Semiconductor Equipment	62725.3	56664.7	16.71%	Navitas Semiconductor Corporation (3.91), Cirrus Logic Inc (3.82), Diodes Incorporated (3.69)
Software	168340.3	170061.3	50.14%	Adeia Inc (3.96), ACI Worldwide Inc (3.88), Progress Software Corporation (3.82), Teradata Corporation (3.74), Verint Systems Inc (3.73), Blackbaud Inc (3.73)
Technology Hardware, Storage and Peripherals	11073.4	6395.9	1.89%	
Total	450962.8	339203.9		

(Left margin label spanning Software and Technology Hardware rows: "Small Cap")

Diversification by Correlation

Additionally, to maximize expected returns while minimizing risk, we tested the correlation between the monthly returns of the companies on our shortlist and the companies we currently hold a position in as well as the S&P 500. The results demonstrate that Qualys overall has relatively optimal values that are lowly correlated with our fund's current positions; other mid-cap and small-cap software companies including Gen Digital Inc., ACI Worldwide Inc.will be ruled out at this stage due to their high correlation to our companies within our current portfolio and/or the S&P 500.

Figure 2: Sample of 1-Year and 3-Year Monthly Returns of the Shortlist vs Current Portfolio Positions

	Name	Gen Digital	Qualys, Inc.	Dolby Laboratories	Dropbox Inc	Adeia	ACI Worldwide, Inc
	Ticker	GEN	QLYS	DLB	DBX	ADEA	ACIW
1 Year correlation matrix	AAPL	0.36	0.4	0.51	0.47	0.47	0.35
	MSFT	-0.05	0.03	0.48	0.40	-0.09	-0.28
	TXN	0.25	0.2	0.79	0.70	0.38	0.08
	INTU	0.53	0.46	0.33	0.39	0.33	0.64
	KLAC	0.39	-0.01	0.64	0.71	0.24	-0.27
	AMZN	0.31	0.49	0.37	0.52	-0.02	0.23
	GOOG	0.3	0.4	0.49	0.58	0.07	-0.01
	VOO	0.69	0.08	0.71	0.61	0.55	0.3

	Name	Gen Digital	Qualys, Inc.	Dolby Laboratories	Dropbox Inc	Adeia	ACI Worldwide, Inc
	Ticker	GEN	QLYS	DLB	DBX	ADEA	ACIW
3 Years	AAPL	0.45	0.32	0.6	0.39	0.47	0.5
Correlation	MSFT	0.23	0.1	0.63	0.46	0.19	0.22
Matrix	TXN	0.35	0.11	0.67	0.53	0.43	0.26
	INTU	0.4	0.29	0.58	0.42	0.41	0.56
	KLAC	0.4	0.03	0.68	0.46	0.36	0.2
	AMZN	0.46	0.3	0.39	0.37	0.19	0.37
	GOOG	0.39	0.29	0.53	0.42	0.25	0.3
	VOO	0.61	0.17	0.76	0.57	0.56	0.52

Diversification by Revenue with Respect to Geographical Region

With the aim to minimize over reliance on either domestic or international sales, we additionally considered the diversification in revenue with respect to geographical region for companies under consideration. This is of particular importance for our sector as, for example, recent political tensions between the United States and China have led to proposed limitations on the sale of U.S. chips in that region. Qualys demonstrates a healthy spread of their revenue as shown through data indicating that 60% of it can be attributed to domestic sales and 40% being obtained from international sales.

Figure 3: Sample of Revenue Diversification by Geographical Region

	United States	292.291
	Foreign (Outside U.S.)	197.432
QLYS	India	0
	Rest of World	0
	Segment Adjustment	0
Sale rate in US		59.68%

	Segment Name	Revenue
	Americas (Excl. United States)	103
GEN	Europe, Middle East and Africa (EMEA)	506
	Asia Pacific and Japan (APJ)	327
	United States	1860
	International	0.00%
Sale rate in US	Percentage in the U.S.	66.52%

Investment Criteria

To conduct our quantitative analysis, we considered the following to measure the health of a given company: profitability, size, stability, efficiency, solvency, and consistency in revenue payback of a given company. The final averaged scores were scaled according to a standardized z-score ranking system on a range from 1 to 5, with 1 being low value companies and 5 being high value companies. Due to the differences in the behavior of these values between companies of different market cap sizes, we assigned weighted averages specific to their respective market cap sizes and compared companies only against those in the same category as themselves. We then compiled a shortlist of companies to consider based on these finalized rankings; overall, the software companies (notably Qualys and Gen) performed the best.

Quantitative Analysis Overview

Our analysis determined that the best company from our shortlist to focus on as our final recommendation was Qualys. The company had a fairly strong ranking relative to the rest of the mid-sized companies in the Information Technology sector with a weighted average score of 3.77. The scores for mid-cap companies ranged from 1.01 to 4.01 with an average score of 2.72. The company is also an attractive addition to our portfolio as demonstrated in our checks for correlation to our currently held positions and due to their diversification in revenue. Qualys had a particularly low ranking of 1.00 for its dividends; however, the company is currently strategizing stock buybacks and reinvesting into the company over paying shareholders dividends. As demonstrated by their financial data, the company has a healthy increase in earnings and free cash flow over a 10-year window.

Figure 4: Sample of Comparable Analytics of Mid and Small Cap IT Companies

Company Name	Market Cap	Primary Industry	Profitability	Size	Dividends	Sh. Out. Delta	Earnings	True ROA	Margin	Debt Load	Consistency	Final Score
Gen Digital Inc. (NasdaqGS:GEN)	12,059.8	Systems Software	4.85	2.91	5.00	3.00	4.32	3.79	4.99	1.50	4.82	3.86
Qualys, Inc. (NasdaqGS:QLYS)	5,621.4	Systems Software	3.78	1.33	1.00	3.43	3.60	4.89	4.96	5.00	3.46	3.77
Adeia Inc. (NasdaqGS:ADEA)	1,109.2	Systems Software	3.30	1.64	5.00	2.30	4.90	4.98	1.00	5.00	4.10	3.96
ACI Worldwide, Inc. (NasdaqGS:ACIW)	2,531.4	Application Software	4.26	2.71	1.00	4.72	3.12	2.15	1.16	5.00	4.43	3.88
Progress Software Corporation (NasdaqGS:PRGS)	2,439.8	Systems Software	4.58	2.75	2.57	4.64	4.53	4.94	3.06	3.20	4.03	3.82

Figure 5: Sample of Financial Models

Qualys Inc.

Year	Rev/sh	Rev %	EPS	Margin (%)	Div/sh	Sh. Out	Op CF	CapEx	FCF/sh	Debt Issued	Debt Repaid	Net Debt/sh	FCFE/sh
t-10	3.33		0.04	11.04	0.00	32	25	-14	0.35	0	-1	-0.04	0.32
t-9	3.94	18.39%	0.81	15.83	0.00	34	41	-14	0.81	0	-1	-0.02	0.79
t-8	4.77	21.14%	0.42	23.84	0.00	34	66	-20	1.33	0	0	0.00	1.33
t-7	5.44	14.09%	0.50	23.80	0.00	36	69	-23	1.27	0	0	0.00	1.27
t-6	5.98	9.77%	1.01	25.07	0.00	39	108	-38	1.81	0	0	0.00	1.81
t-5	7.14	19.55%	1.37	28.42	0.00	39	125	-23	2.63	0	-2	-0.04	2.59
t-4	8.23	15.16%	1.68	32.17	0.00	39	161	-28	3.40	0	-2	-0.04	3.36
t-3	9.26	12.53%	2.25	35.68	0.00	39	180	-30	3.83	0	0	0.00	3.82
t-2	10.53	13.80%	1.77	36.70	0.00	39	201	-24	4.51	0	0	0.00	4.51
t-1	13.23	25.60%	2.74	33.73	0.00	37	199	-15	4.96	0	0	0.00	4.96
TTM	14.70	11.09%	3.69	33.71	0.00	37	255	-10	6.64	0	0	0.00	6.64
5-yr ave		15.52%	21.9%		#DIV/0!	-1.2%			20.36%				20.74%
10-yr ave		16.02%	57.2%		#DIV/0!	1.3%			34.14%				35.62%

Gen Digital Inc.

Year	Rev/sh	Rev %	EPS	Margin (%)	Div/sh	Sh. Out	Op CF	CapEx	FCF/sh	Debt Issued	Debt Repaid	Net Debt/sh
t-10	6.05		0.13	18.12	0.60	692	1,281	-194	1.57	0	-1,189	-1.72
t-9	5.81	-3.90%	0.16	17.01	0.60	681	1,312	-303	1.48	0	-21	-0.03
t-8	5.88	1.17%	-1.23	24.00	0.64	612	802	-272	0.87	500	-350	0.24
t-7	6.61	12.38%	-0.38	12.94	0.36	608	-209	-70	-0.46	6,069	-90	9.83
t-6	4.01	-39.37%	1.44	18.17	0.33	639	950	-142	1.26	0	-3,210	-5.03
t-5	3.97	-0.83%	-0.17	24.27	0.35	618	1,495	-207	2.08	0	-600	-0.97
t-4	4.23	6.40%	0.90	32.97	0.43	589	-861	-89	-1.61	300	-868	-0.96
t-3	4.40	4.05%	1.16	46.14	0.64	580	706	-6	1.21	750	-1,941	-2.05
t-2	4.82	9.58%	1.41	48.53	0.52	580	974	-6	1.67	512	-541	-0.05
t-1	5.21	8.07%	2.16	46.91	0.49	641	757	-6	1.17	8,954	-3,047	9.22
TTM	5.89	13.16%	2.19	48.32	0.51	641	981	-11	1.51	0	-575	-0.90
5-yr ave		8.21%	-265.9%		7.6%	0.7%			-6.19%			
10-yr ave		-0.26%	32.6%		-1.7%	-0.8%			-0.37%			

Progress Software Corporation

Year	Rev/sh	Rev %	EPS	Margin (%)	Div/sh	Sh. Out	Op CF	CapEx	FCF/sh	Debt Issued	Debt Repaid	Net Debt/sh	FCFE/sh
t-10	6.48		0.72	27.95	0.00	52	5	-4	0.01	0	0	0.00	0.01
t-9	6.56	1.35%	0.96	31.47	0.00	51	108	-8	1.97	0	0	0.00	1.97
t-8	7.42	13.01%	-0.17	19.25	0.00	51	105	-7	1.91	150	-6	2.84	4.75
t-7	8.32	12.14%	-1.13	26.87	0.00	49	103	-6	1.99	0	-9	-0.19	1.80
t-6	8.39	0.87%	0.60	32.63	0.52	46	106	-3	2.21	0	-11	-0.24	1.96
t-5	8.39	0.05%	1.08	31.99	0.57	45	121	-7	2.53	0	-6	-0.14	2.39
t-4	9.16	9.18%	0.58	31.18	0.62	45	128	-4	2.76	185	-5	3.98	6.74
t-3	10.00	9.12%	1.76	34.39	0.68	44	145	-7	3.13	99	-11	1.97	5.10
t-2	12.03	20.26%	1.76	33.78	0.71	44	179	-5	3.94	360	-117	5.49	9.43
t-1	13.89	15.49%	2.15	33.58	0.72	43	192	-6	4.29	7	-7	0.01	4.31
TTM	15.48	11.49%	1.77	34.10	0.72	44	181	-6	4.01	195	-62	3.06	7.07
5-yr ave		13.03%	10.4%		4.8%	-0.7%			9.68%				24.21%
10-yr ave		9.11%	9.4%		#DIV/0!	-1.7%			89.09%				100.11%

The companies under consideration did not have particularly significant trends in shares outstanding; however, Qualys and Gen Digital have experienced strong growth in their 10-year margin as well as a strong increase in earnings. As mentioned previously, Qualys does not distribute dividends to its shareholders. Overall, based on our inspection of attributes for diversification and our comparative quantitative analysis we would like to proceed with Qualys and will demonstrate findings from our qualitative that indicate reasons why the company is a valuable investment opportunity.

Company Overview: Qualys Inc.

Qualys Inc. (Market Cap in $mm: 5,638.6) is a U.S. based cybersecurity company founded in 1999 with over 10,000 customers that offers security and compliance solutions including cloud-based security and web application security with an emphasis on vulnerability management, detection, and response (VDMR) products. The company went public in 2012 and provides a subscription-based platform that allows clients to monitor multiple IT assets in a user-friendly design to reduce the complexity and costs that would otherwise be associated with the client's cybersecurity needs. The platform additionally is able to be cross integrated among various services including AWS, Microsoft Azure, and Google Cloud.

Catalysts for Growth and Strategic Investments

Qualys has a particular focus on small and mid-sized businesses that allows them to avoid being directly in competition for larger clients that companies such as Palo Alto Networks market towards. This also liberates them from the downsides of consumer based cybersecurity companies such as

Gen Digital Inc. who are directly competing against companies like Amazon, Google, and Microsoft that can easily incorporate cybersecurity products into their already existing services and operating systems. The company currently demonstrates a 90% retention rate of its clients with the average client lifespan being around 10 years making this company experience the benefits of any vital service that requires regular usage which allows them to be relatively resilient to economic downturns. The increased dependence on businesses to use cloud services to source, transmit, and deploy data for various uses allows for Qualys' cross-integrated cloud based cybersecurity platform to be an attractive product over the coming years. This combined with their current and expanding customer base should allow the company to increase their revenue over the coming years.

Additionally, the company has an economic moat in not only their range of both vulnerability management and non-vulnerability management solutions, but also due to the difficulty for clients to switch between cybersecurity vendors. Similarly to routing and networking services, if a company wanted to switch cybersecurity vendors they would have to spend a significant amount of time as well as financial costs to make this change. In particular, companies taking full advantage of the cross-integratable capabilities of the Qualys platform are highly likely to maintain their relationship with the company. Another issue for companies that are increasingly relying on cloud-based work is that compliance initiatives, such as the General Data Protection Regulation (GDPR) enacted by the European Union in 2018, make it essential for cybersecurity solutions that can assist companies with the administrative review process to maintain company adherence to both domestic and international standards. Qualys' platform will be deeply ingrained within the IT infrastructure of their clients which will make it a difficult process to switch cybersecurity vendors as it entails that the client will have to deal with entire changes in workflow, compliance adherence, and other logistics associated with making such a foundational change. This should not only help the company maintain relatively stable revenue results, but also boost sales as an increasing number of small to medium sized businesses will need to deal with compliance issues in an increasingly cloud-based environment.

The company also is investing into strengthening and expanding the scope of the cybersecurity services with a particular focus on vulnerability management products. In April of 2023, Qualys partnered with the cybersecurity company Cowbell to improve the performance of their external attack surface management (EASM) systems in place which will allow them to better monitor, detect, and respond to malicious threats. Additionally, Qualys has made moves towards company acquisitions of smaller businesses; in particular, they recently acquired Total Cloud and Blue Hexagon. This acquisition has given them access to more than 10 trillion data points as well as access to the machine learning and deep learning tools that were in development at the acquired companies which will further strengthen Qualys' already existing tools to deal with cybersecurity threats. Data is particularly important for machine learning models because as opposed to traditional statistical models that rely on assumed distributions of the data, machine learning and AI algorithms rely on a huge collection of data points to look at relationships between the data to drive a desired result. With the additional data and tools obtained from acquired companies as well as the data that Qualys itself can collect from users utilizing their platform to be cross-integrated with other various cloud services, we believe that through the continuous focus on improving their cloud native application protection platform the company will be able to attract more clients to further improve their sales.

Qualys has taken appropriate measures to address the combined impacts of an increasingly cloud-based future work environment, increased necessity for businesses of all sizes to adopt cybersecurity solutions, increased pressure for compliance review by domestic and international

bodies, and increased threats from advances in AI/machine learning requiring equally sophisticated responses. Due to the companies demonstrated initiatives towards these core catalysts for growth, we recommend for the Student Investment Fund to add Qualys to our current portfolio.