University of Louisville REACH Center

REACH Center IT Strategic Assessment Report for The CRC, ALC, GEN 103/104/105 Courses and Emerging Programs

04/25/2022

Revision History

Date	Version	Description	Author
March 9, 2022	1	REACH Strategic Assessment	Mike Bergamini
April 25, 2022	2	REACH Strategic Assessment	Mike Bergamini

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1. Executive Summary

For the Computer Resource Center, 8 laptops with 8GB of RAM and 256GB of memory will operate at a sufficient speed and will run programs like Visual Studio 2022 at a pace that is acceptable and generally faster than student's laptops. Students use the CRC for reasons beyond tutoring, such as test taking and studying. These 8 new laptops will operate at a speed that students will find satisfactory. 8 new laptops will cost $3,599.92 plus tax and 8 new security locks will cost $159.92 plus tax, bringing the total to $3,759.84 plus tax.

For the Academic and Leadership Center, 2 new laptops will cost $899.98 plus tax, 2 new security locks will cost $39.98 plus tax, bringing the total to $939.96 plus tax. These 2 laptops will have the processing power to support CAD design software as well as computer programming IDEs such as Visual Studio, Python Community Edition and Python Online. Due to students in the Speed School having to purchase Thinkpads, the need for hardware is less than that of the CRC.

The ALC space needs an update. An update to the ALC space is outside of the scope of this project, however it should be noted due to students and tutors reporting that the room is cold and uncomfortable in the winter.

GEN 103/104/105 courses need 30 new laptops. This would cost $13,499.70 plus tax. The 30 new mouses would cost $213.60. Bringing the total to $13,713.30. The GEN courses Chromebooks lose support next year. When Chromebooks lose support they no longer receive any updates. This includes security updates. It is important that whatever devices are connected to the U of L network are secure.

Laptops are mobile and can be easily transported from BAB 247 to BAB 248 and any other room that may be needed. The laptops also provide a Windows OS with greater processing power. These devices will be powerful enough and have the capability to meet future needs. It must be noted that for GEN 105 in particular the instructor would like the laptops to have a touchscreen due to students and

instructors use of OneNote in the course. Unfortunately, the Dell Inspiron 15 3000 is not a touchscreen. Touchscreens generally add to the price of the laptop. If a touchscreen is required, then the total price of the purchase could be raised by hundreds or several thousand dollars.

For Emerging Programs, the best strategy is to prevent a situation where a large one-time donation is needed to cover technology costs. A rolling budget for IT expenses is needed. This budget by no means has to be large. A rolling budget of just $2,000.00 is enough money to purchase at least 4 new computers a year. If 4 new computers are purchased a year over the course of 8 years, that will result in a net gain of 32 new computers. A yearly rolling budget is the best solution for all of REACH's IT needs.

It would be preferable to have REACH be under one IT umbrella that communicates with U of L IT. U of L is a large organization with a lot of IT hardware, and future hardware needs could be met by networking and seeing if there is any hardware available to be had in the broader U of L IT environment. This could present the opportunity of solving IT hardware issues without having to seek money from a donor.

Total Cost of Best Alternatives is $18,413.10.

The author encourages the reader not to view the authors best alternatives as set in stone nor the price of the alternatives as set in stone. Prices change and so do needs. If the reader finds other alternatives better suit their needs, then the author encourages the reader to pursue that alternative.

2. History and Purpose

2.1 History of the REACH Center

Resources for Academic Achievement (REACH) was created on July 1, 2000 and began as an academic support unit organized under the Academic Provost's Office. REACH has evolved into a large and complex academic support unit at the university that offers structured study sessions and tutoring for 100, 200, and some 300 level undergraduate courses. REACH also offers seminars and workshops on

student success topics, computer science, computer usage, intervention courses in mathematics and reading, graduate school test prep workshops and practice exams, academic self-help resources, financial success modules, and summer programs. Today, REACH is organized under Strategic Enrollment Management and Student Success (SEMSS). Main operations moved to the new Belknap Academic Building in August 2018, and REACH uses satellite centers located in Ekstrom Library (CRC), the J.B. Speed building (ALC), and in classrooms all around campus. In December 2019, UofL's testing services officially realigned under REACH. REACH has 15 full-time professional staff, 11 graduate assistants, and 200+ tutors each academic year.

2.2 Purpose of the REACH Center

To enhance or improve students' academic performance, to help students transition to college life, and to support the university's retention of undergraduate students. Tutoring and mentoring is at the heart of REACH's mission. REACH offers tutoring in dozens of classes and data has shown that students who use REACH definitively have better outcomes than those that do not. The purpose of the REACH center is fulfilled every time a student uses the services provided.

The ultimate purpose of any academic institution is to ensure the success and graduation of all students who enroll. Many students face challenges in achieving the goal of graduating. Whether it be the stress of taking on thousands upon thousands of dollars of student loan debt. The stress of working a full time or part time job while going to school full time or part time. Or how to manage work vs. school vs. family vs. friend time.

The greatest challenge a majority of students face is financial. Millions of Americans live paycheck to paycheck. Millions of students live paycheck to paycheck. The financial opportunity for a student to purchase the latest technology does not exist for millions of students. However, students are expected to learn how to use and excel at using the latest technology. Whether it be mastering a programming language, learning the ins and outs of the latest data analytics tools, or even to understand how to search on google to find the answer to a simple technology problem.

The author of this report has worked in the REACH Center CRC for a year and has tutored CIS 199, CIS 150, CIS 205 and CIS 305. The course that students struggle with the most is CIS 199. CIS 199 is the Introduction to Software Development course. This course focuses on learning the basics of the C# programming language. C# was developed by Microsoft. The program that a student uses to write C# code is called Visual Studio. This program is a heavy lift even for a computer that is only a couple years old. In order for Visual Studio to run at a tolerable pace a student would need a machine with at least 8 GB of RAM and ideally at least 128 GB of storage. Also, a computer running a Windows OS is a great advantage.

Many students have Apple products. And the College of Business does not provide students with a laptop. The Academic and Leadership Center's students do not face the same challenge as the College of Business students due to the Requirement that Speed School students have to buy a ThinkPad, which can cost from $1,000 to $2,000.

Visual Studio for a Mac is different from Visual Studio that runs on Windows. However, students with a Mac do have a solution for this problem. The University of Louisville provides all students with access to a free Virtual Machine (VMware) that runs the Windows OS. And this VMware can be run on a Mac. However, running VMware as well as Visual Studio at the same time, on the same machine, takes up a lot of the computer's processing power. This results in a very slow environment. The author can think of many instances where the student has been using VMware and running Visual Studio. The student then attempts to compile a program that the student wrote themselves. This compiling process can sometimes take up to 1 minute. If the student had a proper machine, it would take anywhere from 1 to 15 seconds.

This may not seem like a lot of time. But when students are writing, testing, and debugging programs, compilation can and should occur dozens if not hundreds of times. Testing and debugging is at the heart of good program design. And when you compile a program numerous times, time adds up.

It is the role of the educational institution to make every student literate in the current technology of our day. The author of this paper is too familiar with the technology struggles of the student body. Whether it be students not having a PC with a processor capable of running VMware at a sufficient speed, a MacBook that is 5+ years old, an HP laptop with only 64 GBs of storage, or a student that can not afford to buy a laptop. The gap between what technology the student needs and what technology the student can afford is vast.

3. Management and Business Processes.

3.1 CRC, ALC Tutoring

Tutoring is what REACH does best. At the beginning of every semester, and throughout the semester, multiple emails, text messages and in class introductions to REACH staff are conducted. These are done to introduce students to the services that REACH provides.

When students are struggling with a subject or have a question about a subject, they are encouraged to come to the REACH center. REACH offers in-person as well as online instruction. If a student due to time constraints cannot meet a REACH tutor at their designated hours, REACH will make accommodations for that student to receive tutoring at an alternate time.

3.2 GEN 103/104/105

GEN 103 and GEN 104 review Algebra content and math study strategies with curriculum specifically designed for entry-level University of Louisville mathematics courses for STEM and non-STEM majors. Non-STEM majors (GEN 103) require MATH 105 or another QR course, and STEM majors (GEN 104) require MATH 111 or a MATH course other than MATH 105. Students receive 3 hours of college credit (elective credit only) for the GEN 103 or GEN 104 course. GEN105 provides an intervention for college reading. Students who enroll in this course will receive 2 hours each week of supplemented instruction in college reading, critical thinking, and study strategies. Students receive 2 hours of college credit (elective credit only) for GEN 105.

3.3 Management Responsibilities

Management interviews and hires new employees as well as maintains the networks that connect the computers in the CRC and ALC. Management conducts training exercises and reviews employee performance. Management also handles HR issues and coordinates with students to help students find a tutor for a course they need help with.

4. Current IT Environment

4.1 Hardware

Computer Resource Center Hardware

4 LG flatscreens TVs

4 iPads 8th gen

17 Dell Keyboards

17 Dell mouses

17 Dell Optiplex 3030 AIO Series Computers, 4GB RAM, 64-bit OS, Intel Core CPU 3.60 GHZ

Network Server

GEN 103/104/105 Hardware

30 Chromebooks

Dell Charging Cart for computers/Chromebooks

Academic and Leadership Center Hardware

2 Dell keyboards

2 Dell mouses

2 Dell Monitors

1 Projector

1 Dell Desktop Optiplex 7020 Intel Core 17 3.6 GHZ processor

1 Dell Desktop Optiplex 790 Intel Core i3

4.2 Software

Computer Resource Center Software

Windows 10 Pro

iOS 15.1 for iPad

Microsoft Teams

Mersive Solstice

Safari

Microsoft Office

SmartControl

Apache

GEN 103/105/105 Software

Chrome OS

Hawks (Math website)

Microsoft OneNote

Microsoft Office

Academic and Leadership Center Software

Windows 10 Enterprise 8 GB RAM 64bit OS

CAD design programs

Python Online

Python Community Edition

4.3 Staff IT Skills/Training

To work at the Computer Resource Center or the Academic and Leadership Center a student must be currently enrolled at the University of Louisville with a minimum cumulative GPA of 3.0 or a minimum GPA of 3.0 for the last full-time semester. Candidates will need to obtain one faculty recommendation per subject they wish to tutor. Candidates who only plan to tutor in one subject will also need to obtain a second recommendation from another source such as an advisor, other employer, or other faculty member. The candidate must have expertise in course content or programming languages that will be tutored. Possess a strong work ethic and the ability to maintain a welcoming and approachable presence. Must be responsible, dependable, honest, and mature. Must be friendly, patient, and sensitive to the diversity of students and their individual needs.

Upon being hired, staff are trained to use the various hardware and software that will be used

to tutor. CRC and ALC staff are trained on how to use TutorTrac for logging tutoring hours as well as logging student hours, and trained to use the Business Ops portal for logging hours worked as well as submitting time sheets. Also, tutors are taught where to find their paystubs on Ulink.

CRC staff is trained to use the iPads that are at each four of the main tutoring stations. On this iPad is Mersive Solstice Client for casting the view of the iPad to the TV at the workstation. This is done so assignment instructions can be displayed to groups of students at one table.

GEN 103/104/105 instructors are trained to use Chromebooks, Chrome OS, Hawks math service, and OneNote.

4.4 IT Budgeting and Spending

REACH operates with multiple accounts to fund its operations. There are accounts for supplies, equipment, salaries, student tutors, coaches and graduate learning assistants. The Student learning assistants account is separate. Annual IT charges, supplies, office supplies, travel funds and food funds are another account. The supplies and equipment funds have 5% off the top held in escrow for improvement. Unused funds go into a Z account, if these funds are not used they are lost. All Z funds swept by provost. Rest of funds tied up in gift accounts, such as donations. Private tutoring and special donations are the two sources of revenue. Canon is also a sponsor. For the vision laid out in this report to become a reality a donor will be needed. The overall budget for REACH is tight. The likelihood of money being found within the REACH budget to upgrade to new IT is small.

4.5 Envisioned IT Budgeting and Spending

There is a need for a rolling IT budget within REACH. This budget ideally would be between $1,000 and $2,000 a year. With this money several new computers could be purchased each year. This would put REACH in a position where a large one-time donation would not be needed to fix existing IT issues. With a revolving budget, incremental purchases of new hardware could be made yearly.

Currently there is a need for at least 40 new computers. If money was not an option, then 52 new computers would be ideal. Out of the 40, 30 are for GEN 102/103/105, 8 for the CRC, and 2 for the ALC. Out of the 52, 30 are for GEN 103/104/105, 18 for the CRC, and 4 for the ALC. In the analysis to follow, the conservative estimate of 40 computers will be used.

A $2,000 a year rolling IT budget can purchase at least 3 new computers a year. And since the new machines will meet the specifications discussed in this report, they should last 8 years. This would provide a long-term and attainable budget goal to consistently replace aging computers. This would provide greater IT infrastructure stability to REACH and would help prevent the current situation of needing a large one-time donation to fix pressing IT needs. Finding many small donors is easier than finding one large donor. The goal of future budgeting should be to establish an account to buy a few new machines each year.

The average lifespan of a computer is 3 to 8 years. The average lifespan of a Chromebook is 8 years at best. Chromebooks are designed to lose support after 8 years. This is the decision that Google has made (PC World). Once a Chromebook “expires” the Chromebook no longer receives updates. Including security updates. Ever. Without updates the Chromebook is a security risk, which would put the University’s larger network at risk. These issues make future Chromebook purchases a non-starter. GEN 103/104/105 currently have 30 Chromebooks that lose support next year (2023).

If 3 computers are purchased a year, it would take 14 years to replace all 40 computers needed. This is why a one-time donation to cover these costs is so important at this time. A bulk purchase of new computers is needed. After fulfilling the current needs, the long-term plan of replacing aging IT infrastructure can be implemented.

5. Future IT Infrastructure Specifications

IT should be compatible with existing systems operated by the University of Louisville. IT

hardware should be new and have the latest OS. There should be an emphasis of quality over quantity. One well-functioning and fast computer is better than 10 slow computers. All machines should have at least 8GBs of RAM. Storage on each device should be at least 256 GBs. All devices should have ethernet ports in order to connect to the CRC LAN. The CRC LAN is run using an Apache server. SmartControl is used to send commands to each of the computers in the LAN. A typical command sent to the computers is to revert back to a specific image. This is done so that each day a set image is reloaded. This reversion is done in case malware or other malicious software infected the computer.

Future hardware should be laptops. They are light, portable, and technology has reached a point where a laptop is just as powerful as a desktop. Desktops require too many individual components, such as a mouse, keyboard and monitor. A laptop has a keyboard, monitor and trackpad in one unit.

Chromebooks should be replaced with laptops. It is important for new students to become proficient in operating a Windows OS. The world runs on Windows. The sooner a student becomes proficient in using and navigating a Windows OS, the more successful that student will be. The Chromebook offers limited functionality. In the future it is likely the GEN courses will change. It is important to have flexible hardware and software to meet the future needs of this program.

5.1 Leadership's Vision

To have a revolving yearly budget to fix IT issues incrementally rather than relying on one-time donations. To have up-to-date functioning hardware and software that fulfills student's basic technology needs.

If a yearly budget is too tight and no money can be allocated for new IT, a proposal should be drawn up of what the most urgent IT issues are. Then a cost assessment done. This proposal should be the groundwork for a fundraiser to meet specific IT needs of REACH.

The Covid Pandemic has tightened budgets across the University. Having a revolving technology budget for the REACH Center may not be a viable option at this time. Therefore a concerted and focused

effort should be made to find a one-time donor to fulfill the current IT needs of REACH. Although this is not an ideal way to manifest a budget, it is the option that provides the best chance of realizing the IT needs of REACH at this moment.

5.2 Computer Resource Center Leadership's Vision

The CRC's vision is to have anywhere from 8 to 17 new computers running the latest Windows OS. This would provide the processing power and storage space needed to satisfy the needs of the students who use the services offered by the CRC. These new computers will run Visual Studio at a fast pace and will provide students with a technology solution that will outperform the student's current technology. This new computing power will enhance the learning experience of students and lead to better outcomes for all parties involved. The type of computer of and quantity of computers will be discussed below in the Closing The Gap section.

5.3 ALC's Leadership's Vision

The ALC's vision is to have 2 to 4 new computers running the latest Windows OS and also to have a device that connects to the current projector in the ALC. These new machines will be capable of running the latest graphics software, statistics software, and the Python Online Compiler at a quick pace. The ALC also needs to renovate to its space. The ALC room has not had any remodeling done in decades. Numerous tutors have voiced concerns that the room is too cold in the winter and makes students and tutors uncomfortable. The walls are exposed brick, and the windows are decades old. Although this renovation is outside the scope of this report, it should be noted that this is a need of the ALC.

5.4 GEN103/104/105 Leadership's Vision

The seminar room has 30 Chromebooks that lose support next year. The strategy is to develop a long-term plan for tech replacement. Laptops would be best. Chromebooks should not be purchased for

this program in the future. There should be an IT system to track laptops that will allow for remote administration.

Laptops provide mobility that desktops do not. Since these 30 new machines will be used in different rooms for different classes, these new devices must be mobile. Also, using an operating system besides ChromeOS would benefit students in many ways. The chrome OS is not a Windows environment. Many new and incoming students may have only used an iPad, Chromebook or tablet device their whole lives. As Microsoft products do not have the same popularity as Apple products, students may not have any familiarity with a Windows OS when first arriving for these classes. It is important to get student acclimated to Windows as quickly as possible because it is the OS that companies use and prefer to use to in their operations.

The new devices should have the standard computer lifetime of 3 to 8 years and run Windows. Windows provides the opportunity for the GEN classes to move away from the Chromebook based browser experience. As the GEN courses evolve over time new computer applications or approaches can be developed and utilized that can take advantage of the Windows OS.

BAB 247 is the main GEN 103/104 computer lab (also called the “Emporium Math Lab”). It has 36 computer stations. Typically there are 30-32 students enrolled in each class that meets in that room. BAB 248 is the REACH seminar room. BAB 248 is a shared space among REACH. It is mostly used for GEN 103/104 and GEN 105 classes. There are typically 25 students enrolled in each class that meets in BAB 248. It is also used for a variety of other purposes such as testing, overflow, workshops, and test prep seminars for GRE, MCAT, etc. The mobile Chromebook cart is in BAB 248. It is locked and has slots for 30 Chromebooks, with power cords in each slot. In Fall 21 there were 750 onsite GEN 103/104 students, plus 100 online. In the past the computer lab in the math department (NS212) had to be used for overflow. This summer, there will be classes and 3 summer programs going on at once. Campus partners have donated additional spaces in the MITC and NS to help with overflow. If another space in the BAB

could be found for teaching and overflow, this would make logistics and scheduling of the GEN courses much easier and reduce the amount of time students and teachers spend entering and leaving classrooms between sessions.

5.5 Top 6 Technology Issues

1. CRC Hardware is out of date and causes the Windows OS to operate at an extremely slow pace. This discourages students from using the CRC computers. All computers in the REACH network should have a processor fast enough to operate large Programs such as Visual Studio or Python Community Edition.

2. All computers that run Windows 10 will lose support in 2025. It is important to obtain new machines that have processors fast enough to handle running Windows 11. Older machines with just 4GBs of RAM run Windows 10 too slowly.

3. The 30 Chromebooks used for GEN classes lose support next year (2023). Google phases out updates for Chromebooks after 8 years. The loss of updates means the loss of security updates. This puts the Chromebooks at risk and the broader U of L network at risk.

4. Not enough students have used a Windows OS before. The sooner a student is exposed to and works with a Windows OS the better. Many of the programs that students will use to complete coursework at the University run better on Windows. Almost all employers run their software on Windows. The benefits of learning how Windows works will last a lifetime. Understanding how to operate and navigate a Windows OS will improve student outcomes.

5. Current technology does not meet future needs. Students should have access to hardware that meets or exceeds their own current hardware. If students know the computers used at the University are more powerful than their own machines, they will use University computers more. This will greatly alleviate the stress felt by students caused by a lack of sufficient hardware which will ultimately lead to better student outcomes.

6. Many students do not have a Windows computer. Many have Apple products. Although a student can run VMware on an Apple machine, this adds another layer of processes the computer must execute, lowering performance. Many student's computers are old, have slow processors, and low memory capacity.

5.6 New Technology Specifications

All new machines should have at least 8 GB of RAM and least 256 GB of storage. These RAM and storage requirements are to ensure that the machines purchased will be able to efficiently run future Windows OS releases, such as Windows 11 and beyond. This will reduce long term costs. All new machines should run Windows OS. The world runs on Windows. Apple devices do not suite the needs of students in terms of the computer programs and course work that students will need to complete. Windows OS is designed to support Windows software such as Visual Studio and SQL Server and many other Microsoft products. Windows programs function most efficiently on a Windows OS. A solid-state drive is preferred due to the faster loading times it provides compared to disk storage. New machines should at least run Windows 10. A mouse of some type would be optimal. Using the trackpad on the laptop while functional, does not provide the precision of movement and functionality that a mouse provides. A webcam is a must. Many students take classes that require the use of a Lockdown Browser. This browser requires the user to have a webcam in order to use the service.

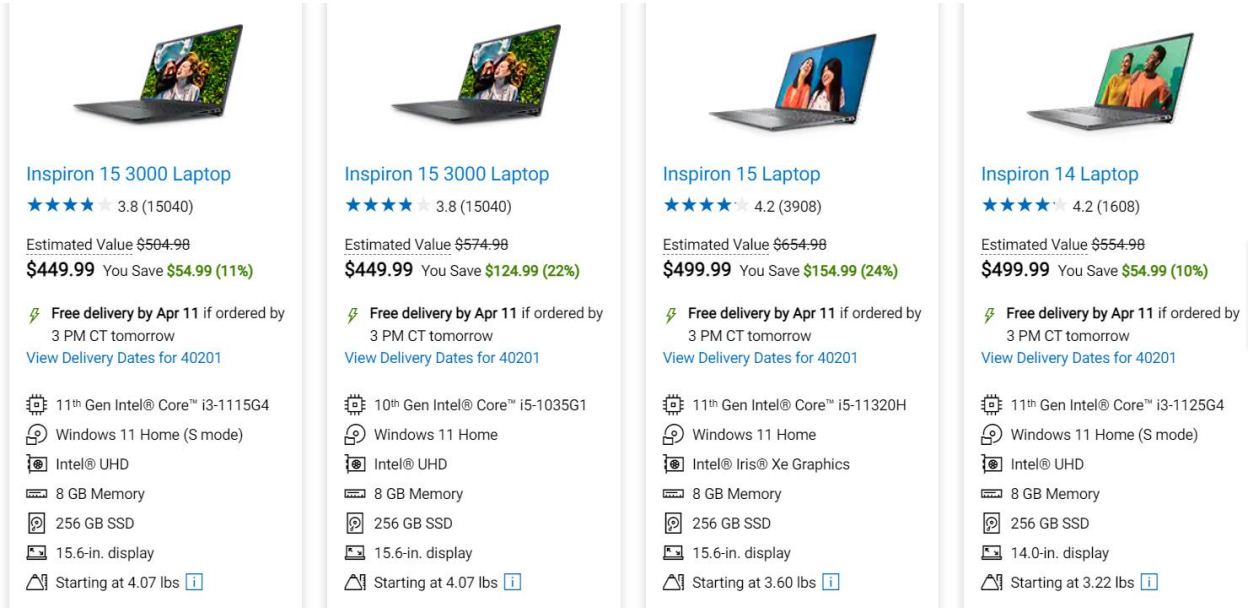
6. Closing the Gap

The First Alternative in any analysis is to not do anything. In certain situations if an IT infrastructure is functioning as designed and does not interfere with the successful operations of business functions, then the best alternative may be to not do anything. This is not the case for this report. The CRC is in desperate need of new computers that will meet modern student's needs. The ALC needs several new computers to meet its student's needs. The GEN courses lose support for their Chromebooks next year. They must be replaced. And a rolling IT budget is needed so hardware can be consistently updated year over year.

6.1 Computer Resource Center Recommendations

6.1 CRC Alternative #1

Purchase 8 laptops that have at least 8GBs of RAM and 256GBs of storage. Laptops meeting these specifications range from $449.99 and $499.99 dollars. All laptops will have locks so they cannot be removed from their stations. Locks cost $19.99. The CRC currently has an inventory of 17 wired mouses so new mouses will not need to be purchased.



Inspiron 15 3000 Laptop
★★★★☆ 3.8 (15040)
Estimated Value $504.98
$449.99 You Save $54.99 (11%)
Free delivery by Apr 11 if ordered by 3 PM CT tomorrow
View Delivery Dates for 40201
11th Gen Intel® Core™ i3-1115G4
Windows 11 Home (S mode)
Intel® UHD
8 GB Memory
256 GB SSD
15.6-in. display
Starting at 4.07 lbs

Inspiron 15 3000 Laptop
★★★★☆ 3.8 (15040)
Estimated Value $574.98
$449.99 You Save $124.99 (22%)
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View Delivery Dates for 40201
10th Gen Intel® Core™ i5-1035G1
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Starting at 4.07 lbs

Inspiron 15 Laptop
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Starting at 3.60 lbs

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Free delivery by Apr 11 if ordered by 3 PM CT tomorrow
View Delivery Dates for 40201
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Windows 11 Home (S mode)
Intel® UHD
8 GB Memory
256 GB SSD
14.0-in. display
Starting at 3.22 lbs

I3C Laptop Cable Lock Hardware Security Cable Lock Anti Theft Combination Lock for iPad Tablet Laptop MacBook Dell HP Lenovo Kindle Surface Samsung Android and All Other Notebooks and Tablets
Visit the I3C Store
★★★★½ 328 ratings | 41 answered questions
Amazon's Choice in Laptop Security Locks by I3C
$19.99
Get Fast, Free Shipping with Amazon Prime
& FREE Returns
Get $10 off instantly: Pay $9.99 $19.99 upon approval for the Amazon Prime Store Card. No annual fee.
Color: black

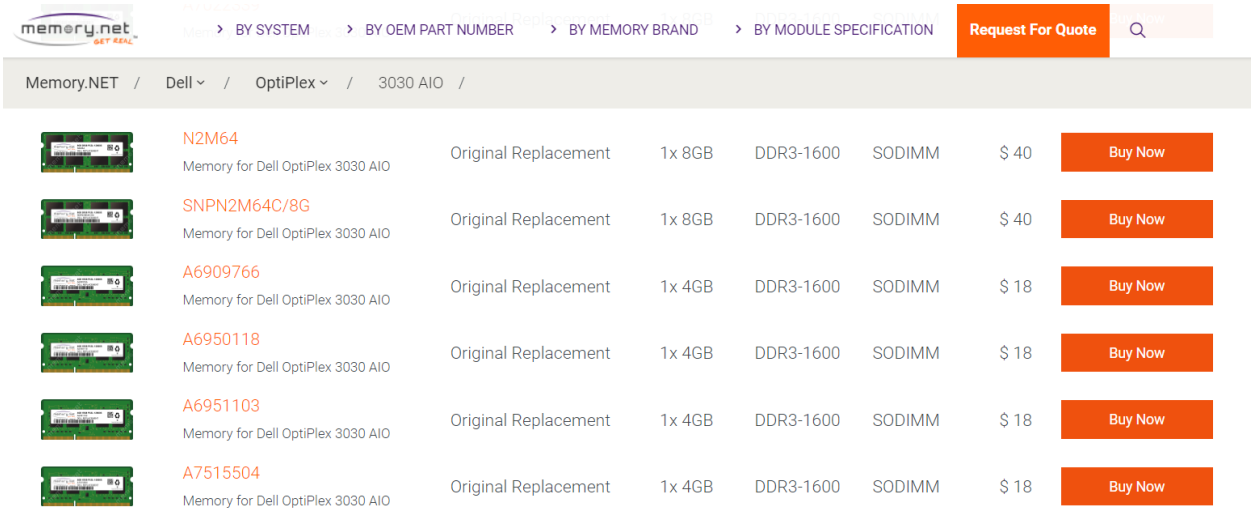
Above is a screenshot of prices of Dell laptops from Dell.com that meets the specifications laid out in this report as well as a screenshot of a security lock found on Amazon.com that meets the specifications laid out in this report. The difference in price of the computers is down to the Intel Core chip used and the graphics card. The $449.99 laptop meets the needs of students. 8 new laptops will cost $3,599.92 plus tax. 8 new security locks will cost $159.92 plus tax. Bringing the total to $3,759.84 plus tax.

6.1 CRC Alternative #2

Purchase 17 laptops that have at least 8GBs of RAM and 256GBs of storage. These 17 new laptops would replace all existing computers available for student use in the CRC. All laptops will have locks so they cannot be removed from their stations. Locks cost $19.99. The CRC currently has an inventory of 17 wired mouses so new mouses will need to be purchased. The difference in price is down to the Intel Core chip used and the graphics card. The $449.99 laptop meets the needs of students. 17 new laptops would cost $7,649.83 plus tax. 17 security locks will cost $339.83. Bringing the total to $7,989.66.

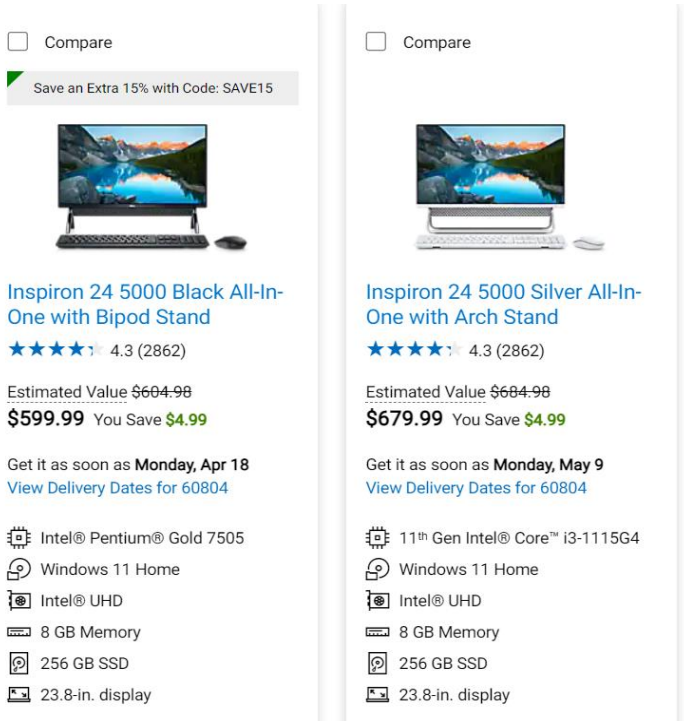
6.1 CRC Alternative #3

Add an extra 4GB of RAM to existing computers in the CRC. According to CRC staff an additional 4GB of RAM did improve the functioning of the current computers to a level that was acceptable. After conducting research this author discovered that Dell no longer sells the type of RAM that is compatible with the 3030 series, however there are other vendors the 3030 series RAM can be purchased from. Memory.net has an extensive list of RAM options.



There are 17 computers in the CRC and an extra 4GB of RAM for 17 computers at $18 each would cost $306.00 plus tax.

6.1 CRC Alternative #4



Purchase 8 new All-in-One Desktops. The current computers in the CRC are All-in-Ones. This option however is a bit more costly than the laptop option. Desktop purchases have been on the decline since the mid-2000s (computerinfobits.com).

8 new All-in-One Desktops at $599.99 would cost $4,799.92 plus tax.

6.1 CRC Alternative #5

Purchase 17 new All-in-One Desktops at $599.99. This would cost $10,199.83.

6.1 CRC Alternative #6

A broader issues that needs to be addressed is the current network setups of the CRC, ALC, and GEN courses in relation to the University of Louisville network. The CRC is currently setup using its own Apache server. Through this connection the images of Windows are maintained on the current computers. This network also handles the outgoing and incoming traffic requests from the computers and browsers. The GEN courses network is managed by a staff of three IT employees in the BAB.

This separation of networks although not an issue currently, does leave the CRC, ALC and GEN courses under a different IT networking environment. Because REACH is spread out over campus it would almost seem inevitable that different IT components of REACH would be managed by different IT functions. One thing that needs to change is the separation of these functions. A closer cooperation between the different teams that manage the different REACH networks and also the U of L IT department would be optimal.

One representative from the University IT Department should be assigned to help REACH problem solve. This would help prevent and repair any future or current political divides between REACH's IT structure and the broader U of L IT structure. This position would also be a great way for REACH to express whatever technology needs or concerns they have with the broader U of L IT environment. The current problems facing REACH stem from aging hardware. There could very well be a hardware solution that is available to REACH within the U of L IT environment, but due to the current relationship between REACH and IT, this potential solution may not be utilized.

Within all organizations there are politics and money. It may not be possible due to legal arrangements or budgetary constraints to transfer hardware from one unit of business that has its own separate budget, to another business unit with its own budget, even though both fall under the broader umbrella of the University of Louisville. But having a voice within the broader IT environment may offer the chance to find larger creative solutions for smaller problems.

6.2 Academic and Leadership Center Recommendations

The ALC currently has one dedicated computer for logging in and out of REACH sessions and another computer for student use. Ideally the ALC would like to have 2 to 4 new computers. Also, the ALC needs to connect a computer to the projector currently in the room, but this a quick and easy fix.

6.2 ALC Alternative #1

Purchase 2 new laptops and 2 security locks. The 2 new laptops will cost $899.98 plus tax. The 2 new security locks will cost $39.98 plus tax. Bringing the total to $939.96 plus tax.

6.2 ALC Alternative #2

Purchase 4 new laptops and 4 security locks. The 4 new laptops will cost $1,799.96 plus tax. The 4 new security locks will cost $79.96 plus tax. Bringing the total to $1,879.92 plus tax.

6.2 ALC Alternative #3

Purchase 2 new All-in-One Desktops. The 2 new All-in-One Desktops will cost 1,199.98 plus tax.

6.2 ALC Alternative #4

Purchase 4 new All-in-One Desktops. The 4 new All-in-One Desktops will cost $2,399.96 plus tax.

6.2 ALC Alternative #5

See CRC Alternative #6. Also, The ALC is in desperate need of an update to the space. The exposed brick and decades old windows make the ALC a cold and uninviting space. Although this is not an IT need, it should be taken into account as it has a negative effect on students and tutors alike.

6.3 GEN 103/104/105 Alternative #1

The GEN courses are unique in that they occur in multiple rooms, such as BAB 247 and BAB 248. This in itself highlights the need for mobility as the computers will be transported between different classrooms as courses and semesters progress. Therefore laptops would be the ideal solution. Since the GEN courses occur in different rooms, buying security cables seems unnecessary. The reason being, if 30 laptops were secured in BAB 247, then BAB 248 needed the laptops next, all 30 laptops would have to be de-secured and then resecured. This would take time. It is recommended that whichever Professor is using the laptops be responsible for ensuring the security of the laptops. Also the new laptops would

need mouses as well. A basic 3 button mouse can be purchased for $7.12 from Amazon.

30 new laptops would cost $13,499.70 plus tax. 30 new mouses would cost $213.60. Bringing the total to $13,713.30.

6.4 Emerging Programs Recommendation

All future planned programs will require IT hardware. As discussed in this report the average lifespan of a computer is 3-8 years. Every 8 years hardware should be replaced. This should not be done on a once every 8 years basis. There should be a rolling budget to replace a fraction of the current hardware each year. For example if you have 8 computers, and a computer's lifespan is 8 years, a new computer should be purchased every year so that a situation of needing a large one-time donation is avoided.

In terms of the budget. It is a traditional practice in large organizations to have a use it or lose approach when it comes to budgeting. Let's say you have a $1,000.00 food budget for an office for a year. If your office only spends $200.00 of that budget for that year, next year's budget will be $200.00. For all emerging programs there should be an analysis done of how much the initial IT hardware will cost and a plan put in place to replace that hardware on a reasonable and continuous basis. Future Programs must price in IT replacement to avoid having to seek large one-time donations.

7. Conclusions

In this next section the author will argue for the best course of action to take. Then there will be an analysis of why other alternatives were not chosen.

7.1 Best Alternatives:

CRC Alternative #1, CRC Alternative #6, ALC Alternative #1, ALC Alternative #5, GEN 103/104/105 Alternative #1, and Emerging Program Recommendation.

The author of this paper notes that prices change. And price can also be dependent on the size of the order. A laptop that costs $449.99 today could go on sale tomorrow for $399.99. The prices given in this paper should NOT be viewed as set in stone but rather a road map to give a general idea of what each alternative will cost.

CRC Alt. #1 This alternative will fulfill the current needs of the CRC. 8 laptops with 8GB of RAM and 256GB of memory will operate at a sufficient speed and will run programs like Visual Studio 2022 at a pace that is acceptable and generally faster than student's laptops. Students use the CRC for reasons beyond tutoring, such as test taking and studying. These 8 new laptops will operate at a speed that students will find satisfactory. The 8 new laptops will cost $3,599.92 plus tax. 8 new security locks will cost $159.92 plus tax. Bringing the total to $3,759.84 plus tax. The smaller the amount of money needed the likelier it is the fund-raising goal will be met.

CRC Alt. #6. REACH has a large presence in the University of Louisville environment. Whether it be new students taking GEN courses, an engineering student that needs math tutoring, or a student who is struggling with his/her own IT issues and needs help. Having REACH be under one IT umbrella that communicates with U of L IT would be helpful. U of L is a large organization with a lot of IT hardware. This could present the opportunity of solving IT hardware issues without having to seek money from a donor.

ALC Alt. #1 will fulfill the current needs of the ALC. The 2 new laptops will cost $899.98 plus tax,

the 2 new security locks will cost $39.98 plus tax, bringing the total to $939.96 plus tax. These 2 laptops will have the processing power to support CAD design software as well as computer programming IDEs such as Visual Studio, Python Community Edition and Python Online. Due to students in the Speed School having to purchase Thinkpads, the need for hardware is less than that of the CRC. However, having multiple devices available to students and tutors to use allows for an environment where projects and applications can be shared on different devices. This will increase student engagement as solutions can be shared and debugged together on separate devices. The total price of $939.96 plus tax is an attainable figure.

ALC Alt. #5 has the same goals as **CRC Alt. #6.** Also, the ALC spaces needs an update. When students are stressed and under pressure to academically perform, the least they can ask for is a warm and inviting space. An update to the ALC space is outside of the scope of this project, however it should be noted due to students and tutors reporting that the room is cold and uncomfortable in the winter.

GEN 103/104/105 Alt. #1 fulfills the pressing need to replace the Chromebooks that will lose support next year. The 30 new laptops would cost $13,499.70 plus tax. The 30 new mouses would cost $213.60. Bringing the total to $13,713.30. When Chromebooks lose support, they no longer receive any updates to their OS, this includes security updates. It is important that whatever devices are connected to the U of L network are secure.

Laptops are mobile and can be easily transported from BAB 247 to BAB 248 and any other room they may be needed. The laptops also provide a Windows OS with greater processing power. In the future if the GEN courses would like to switch to a new software to teach math and reading, these devices will be powerful enough and have the capability to meet future needs.

It must be noted that for GEN 105 in particular the instructor would like the laptops to have a touchscreen due to students and instructors use of OneNote in the course. Unfortunately, the Dell Inspiron 15 3000 is not a touchscreen. Touchscreens generally add to the price of the laptop. If a

touchscreen is required, then the total price of the purchase could be raised by hundreds or several thousand dollars.

Emerging Programs Recommendation. The best strategy to prevent a situation where a large one-time donation is needed to cover technology costs is to have a rolling budget for IT expenses. This budget by no means has to be large. A rolling budget of just $2,000.00 is enough money to purchase at least 3 or 4 new computers a year. By just replacing a few computers a year, REACH can create an IT lifecycle where the latest hardware can be purchased and available to students. If 4 new computers are purchased a year over the course of 8 years that will result in a net gain of 32 new computers. It is much easier to ask for a $2,000.00 donation than a $10,000.00 donation. 32 computers would almost satisfy the year-to-year IT needs of the CRC, ALC, and GEN courses. A yearly rolling budget is the best solution for all of REACH's IT needs.

Total Cost of Best Alternatives is $18,413.10. If this sum of money can be attained, it will greatly benefit the students who attend U of L. Information Technology is at the heart of the modern world. Students deserve to have a plan in place and IT strategy that puts them in the best position to be successful.

7.2 Why The Other Alternatives were not chosen.

7.2 CRC Alternative #2

The main issue with this alternative is the cost. 17 new laptops plus security locks would cost $7,989.66 plus tax. This is $4,229.82 more expensive than CRC Alt. #1. However, if a donor can be found to cover this extra cost, then this alternative should be pursued.

7.2 CRC Alternative #3

Adding an extra 4BG of RAM to existing computers is a short-term fix and does not improve any other aspect of the computer. The monitor, keyboard, video card, etc. will still be the same. The current

computers are 6 years old. The computers in the CRC are currently running an image of Windows 10 which loses support in October of 2025 (cnet.com). While the current computers may run Windows 10 with extra RAM at an acceptable pace, there is no guarantee that they will run Windows 11 at an acceptable pace. Another larger issue with only addressing the RAM issue is that other parts of the current desktops might break over time such as the monitor. If the current CRC computers are not replaced by the time Windows 10 loses support, then the current computers will be 10 years old.

7.2 CRC Alternative #4

All-in-One Desktops, while a solid option, are in general more expensive than laptops. All-in-Ones also do not provide the mobility of a laptop. 8 new All-in-One Desktops at $599.99 would cost $4,799.92 plus tax. This is $1040.08 more expensive than purchasing 8 new laptops. However, if a donor can be found to cover this difference, then this is a viable option.

7.2 CRC Alternative #5

Purchase 17 new All-in-One Desktops at $599.99 would cost $10,199.83. This option is $6,439.99 more expensive than purchasing 8 new laptops.

7.2 ALC Alternative #2

Purchase 4 new laptops and 4 security locks. The 4 new laptops will cost $1,799.96 plus tax. The 2 new security locks will cost $79.96 plus tax. Bringing the total to $1,879.92 plus tax. This option is only $939.96 more expensive than ALC Alt. #1. The need for computers for Speed School students to use is less due to students being required to buy Thinkpads.

7.2 ALC Alternative #3

Purchase 2 new All-in-One Desktops. The 2 new All-in-One Desktops will cost 1,199.98 plus tax. This option is only $260.02 more expensive than ALC Alt. #1. All-in-One Desktops do not provide the mobility that laptops do.

7.2 ALC Alternative #4

Purchase 4 new All-in-One Desktops. The 4 new All-in-One Desktops will cost $2,399.96 plus tax. This option is $1,460 more expensive than ALC Alt. #1.

8. Appendices

8.1 Basis of Analysis

Users (students) need access to information to perform information-intensive assignments for classes at U of L. Blackboard is the center of information transfer between students and instructors. Blackboard is where information for assignments and projects can be found. Having high-performing hardware facilitates the flow of information that students need for success. If the flow of information is hindered, then performance suffers. A slow running program produces slower results which results in less productivity over time.

Both user and IS professionals will be required to assume responsibility for ensuring Information Security. As a learning institution this burden falls more squarely on the shoulder of the University. That is why it is important that all products used have the proper support, including security updates.

Standards for IT lessen the variability of results. Having a base standard of computer hardware and their components increases the likelihood of a positive outcome. A machine's performance should be predictable and reliable. Having a well-functioning machine also reduces IT induced stress.

IT Strategic Planning should meet future needs. Once an analysis is done and future needs are identified, a plan should be developed to meet future IT needs.

Relationships with students will change. New Operating Systems will be introduced, and old Operating Systems will lose support over time. The more robust the OS the more powerful a computer will need to be to provide proper functionality. The functionality of the OS has a direct impact on the IT

induced stress and performance outcome of the student.

8.2 References

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8.4 Figures: