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Coin Miner¶
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Brennan Busza, Tyler Prehl, Ani Tapia, Matthew Weigand¶
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West Chester University of Pennsylvania¶
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Chapter 1 - Vision¶

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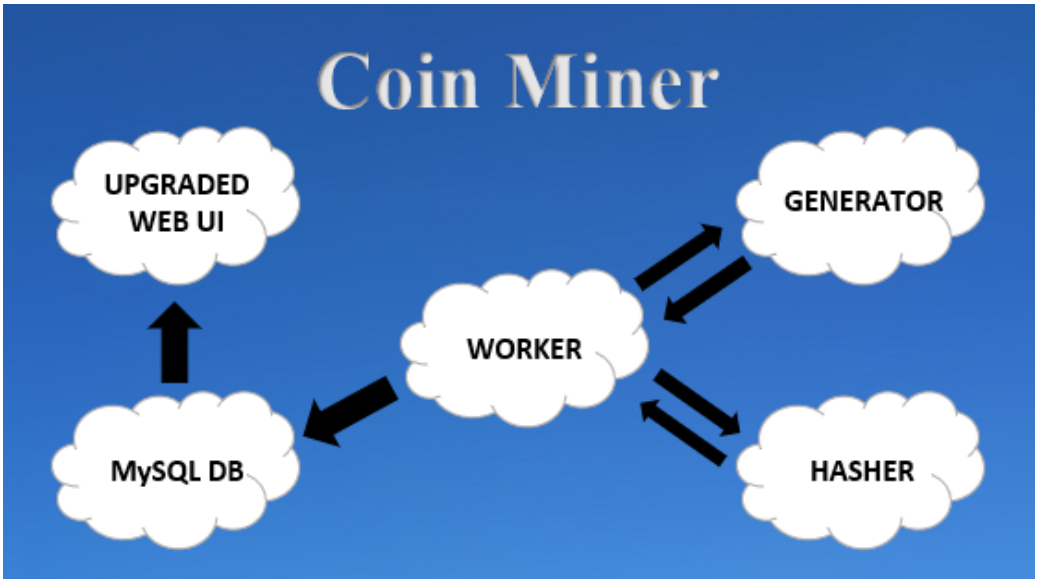


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The overall goal of our coin miner process is to create random target hashes that will be solved and logged for user reference on a website, all of which should occur via cloud computing in a CloudLab experiment. Our coin miner will consist of five distinct parts - the upgraded WebUI, a MySQL database for storing data about the coin mining process, a Worker that acts as the orchestrator between the Generator, Hasher, and MySQL database, and naturally the Generator which produces random target hashes to be solved, and the Hasher that solves the target hashes. In the diagram above, you can identify a basic flow of how each piece interacts with the others. For example, the Worker makes requests to the Generator for random target hashes, which then gets returned to it to be passed off to the Hasher for solving. ¶

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# Chapter 2 - Proposal¶

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→ The purpose of this proposal is to break down each of the five components of the coin miner process - the upgraded WebUI, MySQL database, Worker, Hasher, and Generator. For each component, we will discuss the tool used to develop it, what it will do (with a loose definition of how), and how it applies to the process as a whole.¶

→ The best place to begin the description is with the very start of the overarching process - the Generator. In real blockchain technology, the headers of blocks are hashed which serves as the target hash to be solved. The person whose coin miner solves the hash first while adding in new data is rewarded in coins, and the solution hash becomes the next target hash to be solved as it represents the newest block in the chain. For our project, because we are not implementing an entire blockchain, we will use Python to simply choose a unique hash function (TBD) to hash randomly generated byte strings. These will serve as the target hashes to be solved by the Hasher. As a goal, these hashes should be sufficiently difficult to be solved such that solving them takes longer than a few minutes, if not many.¶

→ The Hasher will be provided with the target hash by the Worker (to be discussed more in depth below) in order to “solve” the hash. Solving the hash entails adding another randomly generated hash - serving as the “new data” being added to the blockchain - to the original hash, and then finding a nonce to tag onto the combined hashes such that when the whole combination of the original hash, the “new data” hash, and the nonce is hashed, the new hash is has a lesser value than the original hash. Using Ruby, we will create a process that loops through nonces - starting with the number zero and increasing by one in each loop - to be combined with the original and “new data” hashes to, through brute force, find a solution. ¶

→ Orchestrating the interactions between the Generator and the Hasher is the Worker. Also written in Python, the worker will act as the middleman that makes requests to the Generator for target hashes and then pushes the target hash to the Hasher to be solved, logging the time it takes for the hasher to solve the target hash in the process. Perhaps the most essential function of the Worker from the user perspective is that it also pushes all the information about each successfully mined coin to the MySQL database. Because all of these interactions are occurring in a cloud environment, special attention will be given to making sure the Worker properly makes requests to the Generator and Hasher, and properly uploads the data collected to the MySQL database.¶

→ The MySQL database will collect five columns of information from the Worker, with each row representing a successfully mined coin. The five columns will include: the start time of the coin mining process for any given coin, the end time of that process, the difference between those times, the target hash that was solved, and the solution hash that was found. This data will be essential for the functionality we hope to provide our users through the upgraded web page.¶

→ Regarding the upgraded WebUI, the basic concept is to use JavaScript to produce a web page that pulls data from the MySQL database to inform a user about the coin mining rate of the coin miner process. The “how to” would involve a simple query to the MySQL database to determine the average amount of time it takes for each coin to be mined. The additional functionality we are looking to provide our users is the ability to find the coin mining rate during a specific period of time. The user would be able to input a start time/date and end time/date, which would then make a query to the MySQL database about average coin mining times within the range dictated by the user. Further functionality may also be applied, but any such ideas are yet to be decided. To polish off the user experience, we intend to implement cosmetic changes to our WebUI that will make the web page more interesting to view for the user. Cosmetic changes could include a coin mining rate “speedometer” that measures coins mined per hour, as well as an overall sharp and modern web page design, with the necessary input boxes and buttons to give users the ability to find out the coin mining rate during a specific period of time.¶

→ These five components are all individually crucial to the success of the overall coin miner process, and each will be treated as such. Future endeavors will include learning how to move the process from a local environment to the cloud in a CloudLab experiment environment.¶

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Chapter 3 - Progress¶

N/A (for now)¶
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# Chapter 4 - Results¶

N/A (for now¶

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## Education

**West Chester University of Pennsylvania,** West Chester, PA — Anticipated Graduation: May 2022
Current GPA: 3.96 — B.S. in Computer Science, Mathematics Minor, Honors College
Year: Senior — Board of Governor's Scholarship Recipient, Montemuro Award Recipient

## Computer Science Skills

| | |
|---|---|
| Languages: | Java, Python, SQL, OCaml, C |
| Tools: | GitHub, VSCode, NetBeans, IntelliJ IDEA, Microsoft SSMS, Jenkins, VMWare, PuTTY |
| Platforms: | Windows, Linux |

## Work Experience

**Computer Aid, Inc.,** DevOps Engineer Intern — June 2021 - July 2021

- Deployed IBM Integration Bus (IIB) major releases to a UAT environment using Jenkins, and pushed occasional hotfixes to production with direct client observation
- Learned how to manage databases in SQL Server Management Studio and how to create effective and efficient queries
- Developed skills in configuring Linux servers manually and was introduced to automatic configuration using Ansible
- Strengthened my professional leadership skills through trainings in interpersonal communication, emotional intelligence, team collaboration, and communication foundations

**West Chester Univ., Learning Assistance & Resource Center**, Peer Tutor Coordinator — August 2019 - Present

- Conducted College Reading & Learning Association-certified training sessions to train future tutors
- Review key concepts of physics and various math subjects to increase students' understanding of the course material
- Introduce and cultivate helpful study skills to help students become independent learners

**West Chester Univ., Residence Life & Housing Services,** Resident Assistant — August 2019 - March 2020

- Informed residents of university and Residence Life policies and documented all incidents
- Fostered a friendly community atmosphere on my assigned floor and throughout the building
- Provided residents with learning opportunities about diversity, health and wellness, sustainability, and student development
- Prepared to handle emergency situations ranging from fire emergencies to suicide prevention

## Achievements / Leadership

**West Chester University**

- Secretary, WCU Competitive Programming Club — May 2021 - Present
- Member, WCU Computer Science Club — August 2020 - Present
- Founding President, WCU Fitness Club — January 2021 - Present
- Member, Upsilon Pi Epsilon Computer Science Honor Society — November 2020 - Present
- Treasurer, WCU Golden Gamers — January 2021 - May 2021
- Treasurer, West Chester University's Serpentine Yearbook Club — January 2019 - June 2019
- College Reading & Learning Association Master Certified Tutor, Level III — November 2020
- Completed the West Chester University Leadership Challenge Series 2018 — October 2018
- Traveled to South Africa to work with the beneficiaries supported by the Honors Student Association — June 2019

**Scouts BSA Troop 12**

- Eagle Scout - Scouts BSA — February 2018
- Assistant Scoutmaster (adult advisor) for Troop 12 — December 2017 - December 2020
- Completed several High Adventures, including a week-long sailing trip and two separate two-week backpacking trips

## Volunteer Experience

**WCU Golden Gamers, Extra Life** — April 2019

Raised $600 for the Children's Hospital of Philadelphia through the WCU Golden Gamers 25 Hour Gaming Event by acquiring sponsors to play games for 25 hours without sleep. The WCU Golden Gamers collectively raised over $9,900.

**Eagle Scout Projects & Troop 12 Service Projects** — 2014 - 2018

Completed a church kitchen remodel including painting, replacing flooring, and cabinet/shelving repairs for my own Eagle Scout Project. Assisted with other Eagle projects including replacing 20-year-old carpet with wood laminate flooring in a church fellowship hall and planting trees to replenish habitats for the National Wild Turkey Federation.

# BRENNAN C. BUSZA

Cell: 610-766-1262 • Email: brennan.busza22@gmail.com • Springfield, PA 19064

## *EDUCATION:*

- West Chester University (anticipated graduation date: May 2022); B.S in Computer Science
  Dean's List 2020 & 2021; Current GPA: 3.66
- Associates of Science Degree, Delaware County Community College, May 2020
  Major: Computer Science; Dean's List; Graduated with Honors
- Saint Joseph's Preparatory High School, Graduated with honors

## *COMPUTER LANGUAGES & RELATED COURSEWORK:*

- Programming and Related Courses: C++, Java, Haskell, Linux, Python, Rust, SQL; Data Structures & Algorithms, Discrete Math, Operating Systems, Computer Security, Software Security
- Proficient in the Following Software programs: Microsoft Word, Excel, Power Point

## *TECHNICAL CLASSROOM PROJECTS*

- **Recreation of Video Game "Pong"** — using GUI, programmed an interactive Pong game with controllable paddles for two players; Java.
- **Joe's Grocery** — programmed a simulated grocery store check-out experience which calculated customer volume, fluctuations in wait time, and number of cashiers needed to optimize resources; Java.
- **Student Catalog** — programmed a master database which compiled student names, majors, ID numbers, and related data, allowing cross reference searches; Java

## *EMPLOYMENT:*

**Marple Sports Arena** | Marple, PA — Summer 2019, 2020 & 2021
***Camp Counselor***

- Oversaw safety and welfare of children ranging from 4-8 years of age; groups of up to 30 kids.
- Recognized as of "Counselor of the Week" and Winner of "Best Counselor of the Summer" Awards each year.

**320 Market — Deli & Restaurant** | Swarthmore, PA — Summer 2018
***Deli Counter***

**The Second City Hollywood** | Los Angeles, CA — May 2017 - September 2017
***Intern, Summer Camp Assistant & Student***

**Delaware County Community College** | Newtown Square, PA — January 2017 - May 2017
***Magazine Editor*** for *Pegasus* — DCCC Literary Magazine

**Tague Lumber** | Media & Kennett Square, PA — June-Sept 2014, 2015 & 2016
***Hardware Assistant***

**American Diabetes Association's *"Camp Freedom"*** — Summer 2013 & 2014
***Camp Counselor*** | Schwenksville, PA

## *ACTIVITIES, ACHIEVEMENTS & AWARDS*

- **Member of WCU Computer Science Club & WCU Competitive Computer Science Club** | 2020 & 2021
- **Participated in the Annual CCSE Programming Competition 2020** | Team: West Chester University
- **Personal Computer Build** | using – AMD Ryzen 5 2600, tomahawk b450, Radeon RX 570
- **Quell Foundation Scholarship Winner, Fall 2019** | Quell Foundation National Award
- **Counselor of the Season, Summer 2019 & 2020** | Marple Sport Arena, Summer Camp Program
- **Counselor of the Week, Summer 2019, 2020 & 2021** | Marple Sports Arena Camp Program
- **Cypher Prime Game Jam** | Interviewed co-owner of local Game design company at Game Jam; played game.
- **International Game Developers Association** (IGDA) Student Member, 2013

**Matthew George Weigand**
2402 Hickory Hill Road, Chadds Ford, PA mattweigand99@gmail.com (443)-655-7737

## Education

**West Chester University** West Chester, PA
Cumulative GPA: 3.62 Computer Science Major
Year: Senior Expected Graduation: Spring 2022

**Moravian College** Bethlehem, PA
*Transferred* Fall 2018 - Spring 2019
-Nursing Major: GPA 3.54 - Dean's List
-Recipient of Moravian College Provost's Scholarship

## Leadership

**Sound Crew, Unionville High School** Kennett Square, PA
*Sound Designer, Head Mic Wrangler* Fall 2015 - Spring 2018
-Created sound effects and worked with microphones for four shows each school year. Worked during school assemblies to ensure microphones and presentations were set up and running properly.

**The 1742 Experience** Bethlehem, PA
*Volunteer* August 2018
-Went to multiple sites around Bethlehem, Pennsylvania to volunteer and give back to the community. Sites included the YMCA, two animal shelters, and two elementary schools.

**Pledge Class Treasurer for Delta Tau Delta** Bethlehem, PA
*Treasurer* February 2019 - May 2019

## Employment

**Moravian College Information Technology Department** Bethlehem, PA
*Information Technology Technician* September 2018 - May 2019
-Answered phone calls and emails about technical issues. Helped fix issues and taught the users troubleshooting methods. Fixed printers and Apple products.

**Wendy's Fast Food Company** Kennett Square, PA
*Shift Supervisor* August 2021 - present
-Managed the restaurant and ensured proper food handling while on-site. Managed the money after shifts and counted food supply to ensure proper ordering was done.

## Computer Science Skills

Languages: Java, JavaScript
Tools: Eclipse, Github, Visual Studio Code
Operating Systems: Windows, Mac

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**Ani Tapia**
**Philadelphia PA 19131**
**267-808-4021**
**Tapia.ani28@gmail.com**

## Education

**West Chester University of Pennsylvania** — Expected Graduation Fall 2022
Computer Science Courses: — Current GPA: 3.61
Computer Sci III, Computer Security & Ethics,
Computer Systems, Foundations of CSC,
Discrete Math, Statistics

**Delaware County Community College** — Graduated: Fall 2020
Computer Science Courses: — GPA: 3.84
Network Communications, Intro to Computer Science,
Intro to Java Programming, Intermediate Java Programming,
Intro to C++, Intro to Information Technology,
Data Structures and Algorithms

## Employment

**Whole Foods Market** Philadelphia, PA 19147 — 2020-2021
Amazon Shopper

- Prepared grocery orders for delivery
- Shopped the store for customer items
- Used smartphones to manage apps and scan bar codes
- Examined order for quality
- Communicated with customers about their orders

## Additional Skills

- Java
- C
- Haskell
- Microsoft Word
- C++
- PowerPoint
- Excel
- Bilingual (English-Albanian)

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