Amazon Bargain Bot

Abigail Clemens
James Park
Steven Wetten
HaoLun Zhang

Table of Contents

Chapter 1: Vision – 2

Chapter 2: Proposal – 3

Chapter 3: Intermediate Milestones – 4

Epilogue: Sources – 8

Epilogue: Resumes – 9

Chapter 1: Vision

Introducing the Amazon Bargain Bot, an innovative program that will revolutionize the online shopping experience by providing users with excellent product selection backed by a comprehensive sorting algorithm.

When searching for products on Amazon, many users are exposed to a plethora of products that just aren't what they're looking for. Whether it be unreasonable prices, terrible reviews, or those sneaky products that have a high rating due to a low review count, the Amazon Bargain Bot aims to reduce user exposure to products such as these.

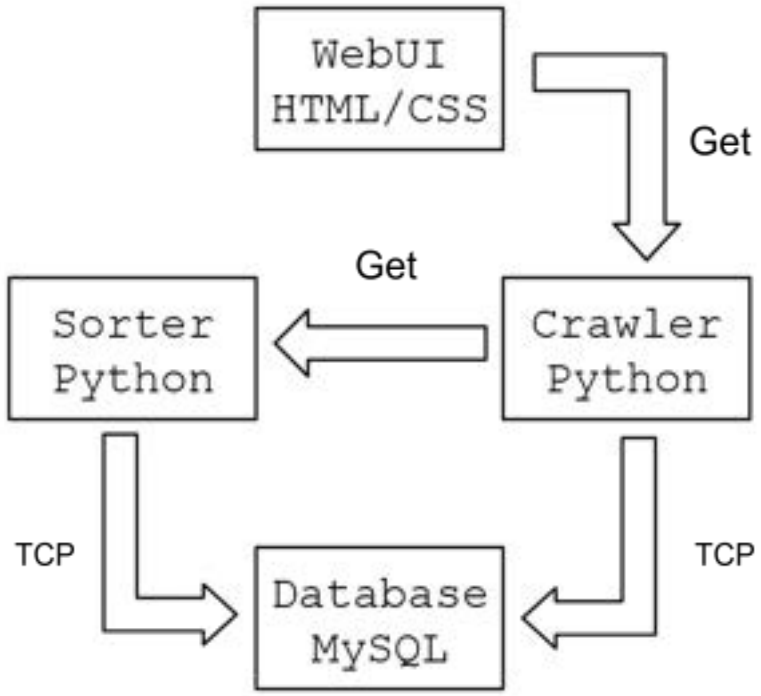
The Amazon Bargain Bot, like most online stores, will prompt users to enter their search term (like table, grill, deck chair, or any other item you could possibly want). Following this, it will scour the Amazon website and store all results into a separate database. Unlike the Amazon UI, however, the Bargain Bot will return only the items worth the user's time, based on a comprehensive sorting algorithm.

The sorting algorithm works as follows: first, all items will be retrieved from the Amazon website. Then, the Bargain Bot will find the average price of all of these items, as well as the average number of reviews. Finally, it will return only the products with; a price at or below the average price of all products; a review count greater than or equal to the average review count of all products; a rating greater than or equal to 4 out of 5 stars. This ensures that the products displayed by the Amazon Bargain Bot are only the best of what Amazon has to offer.

<u>Summary of Key Features:</u>

- User Interface capable of providing a customizable shopping experience
- Comprehensive sorting algorithm ensuring only the best items are displayed
- Removal of most "ad" products

Chapter 2: Proposal



The figure above is a diagram of the Amazon Bargain Bot Architecture, which works as follows: First, the user will interact directly with the WebUI, inputting a shopping search-term, via an HTTP connection, which should work on any chromium browser using the correct URL. Following this, the WebUI will issue a Get call to the Crawler.

The Crawler will establish a connection with the Amazon website and search for the term provided by the WebUI. Following this, the Crawler will parse each product listed on Amazon, storing the description, price, rating, number of reviews, and URL of each of them into a csv file. Then, the Crawler will establish a TCP connection to the MySQL database and import the csv file into a new table. Finally, the Crawler will issue a Get call to the Sorter.

The Sorter will first establish a connection with the database and pull all prices and review numbers for each product in the new table. After finding the averages of these two items, it will return only the items from the table that match the

algorithm stated in chapter 1 to the Crawler. The Crawler will then return this to the WebUI.

Chapter 3: Intermediate Milestones

3.1: WebUI

The WebUI for the search functionality has several components that will come together in a cohesive experience that will allow the user to fine-tune their search to select the best product for their needs. These components are the search bar, the minimum rating field, the price range field, and the minimum number of reviews field. The two main aspects of the database WebUI are the ability to sort results based on various characteristics and the basic layout of the database itself.

The main part of the search functionality WebUI is the search bar. This field will contain placeholder text telling the user to search something. The other fields are used to filter out unwanted search results and give the user exactly what they are looking for. The first of these fields is the minimum rating field. This field will allow the user to select their cutoff point for how much of a positive reception a product would have to receive before they would consider buying it. The second field is the price range field. This would allow the user to make sure that they can afford the product that they're buying and that the product that they're buying isn't too cheap. The third field is the amount of review. This field is important because sometimes a product will have a five star rating but only have five reviews, which calls the quality of the product into question. With this field, a user can select a number of reviews that will guarantee that the review score is accurate.

The database WebUI also has important components. For starters, the layout of the database has several pieces of information about the products searched up. These are the name of the product, a link to the product, the number of reviews, the rating, and the price. In addition, the database allows you to sort by all of these so that the user can determine which product suits their needs the best.

3.2: Crawler

The Crawler, while priorly thought to be the most daunting portion of this project, has surprisingly seen a large amount of progress, second only to the Database. This is due partially to the fact that a premade template for the Crawler was found on Github, created by user praneethravuri. With some modernization and modifications to both fix the script and add some functionality, the script was ready to be implemented into our project design.

The script first uses Selenium to establish a Google Chrome connection and navigates to an Amazon URL corresponding to a search term provided by user input. There, it uses the BeautifulSoup library to parse through the html source code of all pages of results generated by Amazon, separating each result. Then, it stores the description, price, rating, number of reviews, and URL of each product into a new csv file. Next, it uses the Pandas library to manipulate the csv file into a form that will be deemed acceptable by the Database. Finally, after using the MySQL connector python library to establish a connection to the Database, it imports the manipulated csv file into a new table. This script does have a completed respective Dockerfile, has been built into an image, has been pushed to a DockerHub repository, and has been successfully tested as a running container.

While all of these results may seem like an accomplishment, the Crawler still has a long way to go. First and foremost, the Crawler lacks completed yaml files, making Kubernetes deployment currently impossible. The introduction of yaml files will change the needs of the code itself, meaning that there will be more problems during the development of said files. All necessary future changes to the script, due to the introduction of yaml files, that are currently known to the group are listed below:

- The input form is going to need to change. During the deployment process of the crawler component, we encountered an EOF Error, especially when the script attempted to read input from the standard input stream. This error was found to be caused by the use of the Python "input" statement to read user input. This works fine when the script is given input directly by the user but will need to change when input is received through the WebUI. The EOF Error halted the deployment process and required modification of the input mechanism to accommodate the lack of interactive user input in the deployment environment. We are exploring alternative methods to

provide input to the crawler component during deployment. One approach is to pass input parameters as environment variables.

- The naming scheme of the MySQL table is going to have to be discussed and determined. Currently, the script uses a predetermined, hard-coded name for the MySQL table. This works fine for testing purposes, but becomes a problem when the system is used more than once. There are two possible fixes for this. First, the table could be deleted by the Sorter when it is finished generating the return data. Second, the Crawler could search the Database to see if a table already exists under the name of the user's search term, and skip the data collection for this instance, sending the already-existing table to the Sorter right away. This would also speed up the system.

3.3: Sorter

The Sorter, like the WebUI, has seen minimal progress. Currently, the data type to be returned is the only glaringly unknown item, but more will become known in the future.

3.4: Database

The Database is the element of the project that has seen the most progress, as it is essentially finished.

Currently, the Database has a respective Dockerfile and respective yaml files, as well as a built image uploaded to DockerHub. The Database is open to TCP connections and has been successfully manipulated through both solitary and containerized python scripts outside of the reach of the Database. These successful tests were done while the Database was instantiated through Kubernetes, through the use of a service.

The only issues with the Database are that it currently has an unrelated user, an insecure password for said user, and a table that is not essential for this project, due to it being repurposed from an assignment outside of the scope of this project. This can, and will, be fixed by deleting the table, deleting the user,

creating a new, reasonable user, then rebuilding and pushing the image to DockerHub.

Sources:

Ravuri, P (2023) Amazon-Product-Information-Scraper (de72711) [amazon_scraper.py]. https://github.com/praneethravuri/Amazon-Product-Information-Scraper.git.

Abigail Clemens

215-275-1927 | AC946904@wcupa.edu

Education

West Chester University West Chester, PA

Bachelor of Science in Computer Science, Minor in Mathematics *Aug. 2020 – May 2024*

GPA: 3.79/4.0

Relevant Coursework:

- CSC 141 – Computer Science I
- CSC 142 – Computer Science II
- CSC 220 – Foundations of Computer Science
- CSC 231 – Computer Systems
- CSC 240 – Computer Science III
- CSC 241 – Data Structures & Algorithms
- CSC 301 – Computer Security & Ethics
- CSC 317 – Digital Image Processing
- CSC 321 – Database Management Systems
- CSC 335 – Data Communications & Networking I
- CSC 345 – Programming Language Concepts & Paradigms
- CSC 402 – Software Engineering
- CSC 496 – Topics in Complex Systems (iOS App Development)

Experience

Cashier October 2019 – March 2020, June 2021 - Present

Wegmans *Concordville, PA*

- Provided excellent customer service by being friendly to customers and helping them locate desired items
- Achieved a high IPM (items per minute) of 18 in order to assist customers quickly
- Received training in other areas to learn more and help benefit the company
- Learned to work in the deli

Projects

Lexical and Syntax Analyzer | *Java* August 2022 – December 2022

- Analyzed a simple language

Platformer | *Java* September 2019 – June 2020

- Developed a simple computer game that had a goal of jumping over as many moving blocks as possible and recorded a high score

Richman 4 Prototype | *Swift* August 2023 – December 2024

- Developed a simple computer game that had a goal of collecting coins and avoiding bombs

Technical Skills

Languages: Java, Python, Swift, OCaml, C, SQL, R
Developer Tools: Git, IntelliJ, Eclipse

Libraries: NumPy

James Park

jp1014506@wcupa.edu | 610-864-5133 | linkedin.com/in/james-park-0b02a6b6/

I am a product-driven individual with a wide array of professional experiences looking for a full-time position or internship that will lead to gainful employment for my last year at school. AI, Machine Learning, and Natural Language Processing are some of the areas that I would like to learn more about and work in, and I have experience in general troubleshooting for Windows and Macs, Object-Oriented Programming languages, Assembly language, Networking, and more. I am open to working in almost any industry but find work in international or political issues, food, and finance the most interesting.

Education

West Chester University of Pennsylvania West Chester, PA; *Jan 2023-Current*
-Pursuing Computer Science B.Sc. and Linguistics Minor | Expected graduation in June 2025 | Current GPA: 3.72
-Participant in: WCU Sept 2023 Programming Competition | CSTA Hackathon Sept 2023- 1st Place | WCU March 2023 Programming Competition- 3rd Place | March 2023 Python Bootcamp | April 2023 West Chester Programming Competition

George Washington University Washington, DC; *August 2008-July 2012*
-International Affairs B.A. | Chinese Language and Literature B.A.

Additional Skills

-Java, C, Python, HTML/CSS, SQL
-Multilingual in Mandarin, Korean, and Nepali
-Excellent Public Speaker

Relevant Coursework

I have taken courses on Discrete Math, Calculus, Statistic, Java, SSH and other network protocols, along with general education requirements necessary for my degree completion at WCU. These include Chemistry, Geology, & Business Writing.

Work Experience

Infinitus; Remote; *Dec 2023 - Present*
AI Operations Intern
-Developed an understanding of the healthcare insurance landscape, especially issues surrounding payments
-Operated the AI interface at the customer-interaction stage to ensure smooth and useful conversation
-Performed data-entry of patient and insurance information into specific formats for AI improvement

West Chester University Tech-Fee Computer Lab Intern West Chester, PA *May 2023 - Present*
-Monitoring the software, hardware and accessories for the over 3,000 Tech-Fee devices on WCU campus
-Providing support for the faculty/staff and students, including troubleshooting, upgrading devices, and recycling
-Negotiating solutions for issues pertaining to devices, software, and general use of the labs

West Chester University Chinese Language Tutor West Chester, PA *Jan 2023 - Present*
-Providing weekly in-person and online tutoring sessions to students enrolled in the Chinese program
-Coordinating lesson plans and student progress reports with the faculty to ensure student success

Community Academy of Philadelphia Information Technology Intern Philadelphia, PA *June 2022-Jan 2023*
-Assisted in organizing, cleaning, and maintaining inventory of computers for staff and students
-Resolved technology-related issues for faculty and students during school hours
-Organizing spreadsheets to record which devices are with whom

Dig Acres Assistant Manager Chester, NY *June 2018-Oct 2021*
-Lead manager in Food Safety and farm adherence to Good Agricultural Practices (GAP) regulations
-Managed and taught crew of 3-5 apprentices for 8-9 month through an intensive agricultural education program
-Oversaw and organized harvesting, weeding, plowing, and other activities related to day-to-day farm operations
-Facilitated Dig Supply Team and Corporate offices on various projects and operations
-Frequently held or attended events that promoted the farm and company

Peace Corps Nepal Food Security Volunteer Khasyauli, Palpa District *March 2015-June 2017*

-Trained local farmers on growing higher-quality vegetables and increasing seasonal availability, including high-yield intensive methods on small plots of land
-Co-Facilitated week-long agricultural camp for village youths, topics ranged from land-restoration to gender &caste issues
-Established a System of Rice Intensification demonstration with three model farmers, with a 100% increase in production
-Discussed nutrition-related diseases with locals and held cooking & gardening demonstrations with the goal of long-term behavior change

Haolun Zhang

215-882-2692 | eric.h.zhang460@gmail.com

EDUCATION

Delaware County Community College Media, PA

Associate Degree in Computer Science GPA: 3.39 *Jan. 2020 – August. 2021*

West Chester University West Chester, PA

Bachelor's Degree of Computer Science GPA: 3.44 *Sep. 2022 – May 2024*

EXPERIENCE

Equuleus International Clu June 2021 – August 2021

Office Assistant

- Demonstrated expertise in utilizing Excel to effectively sort, filter, and manipulate large amounts of data.
- Extensive experience in using Excel for data cleansing, data validation, and data visualization tasks.
- Skilled in using Excel for data management, organization, and analysis of extensive datasets.
- Proven track record of efficiently managing and organizing large documents using Word's navigation and referencing tools.
- Strong ability to create and format tables, charts, and graphics in Word to enhance document presentation.

Alpha Computer May. 2015 – October 2015

Front Desk Assistant *Malvern, PA*

- Meet and assist incoming customers promptly
- Set up, test, and configure networks, desktops, laptops, and printers,
- Assist in basic administrative tasks, including document filing and record keeping, concerns, and issues professionally and efficiently.

PROJECTS

Database Management Project | *Python, SQL* Sep 2023 – Dec 2023

- Utilizing Microsoft Access to design and develop a database, including creating tables, and establishing relationships.
- Writing queries, and generating reports to support internal data management and information tracking within the organization.

Market Trends Analysis | *Python* Oct 2023 – Dec 2023

- Perform a thorough examination of the used car market through Python
- Utilizing the programming language for data manipulation, cleaning, and exploratory data analysis tasks.
- Using data visualization libraries to generate informative charts and graphs, effectively illustrating market trends within a designated data range.

TECHNICAL SKILLS

Languages: Java, Python, SQL, Ocaml
Developer Tools: PyCharm, IntelliJ, Jupyter Notebook
Libraries: Pandas, NumPy, Matplotlib

Steven Wetten

Lewisberry, Pennsylvania 17339
717-798-1709 stevenwtgf@gmail.com github.com/stevenwetten

Education

West Chester University of Pennsylvania **August 2020 – May 2024**
Bachelor of Science in Computer Science *West Chester, Pennsylvania*

Relevant Coursework

- Data Structures
- Software Engineering
- Cloud Computing
- Networking
- Compilers
- Computer Systems
- Software Security
- Malware Analysis

Work Experience

West Chester University of Pennsylvania **March 2023 – November 2023**
Programming Competition Judge / Writer *West Chester, Pennsylvania*

- Collaborated with a team of peers to write and solve topical and relevant Java and Python programming problems for three separate programming competitions.
- Displayed leadership throughout the development of problems of varying difficulty via coordination and delegation of work.
- Ensured perfection of problems prior to each competition, utilizing a participant/user-oriented mindset.
- Supervised and observed contestants during each competition to ensure participants could compete in a fair and equal environment.

Bobby Rahal Honda **June 2022 – August 2023**
Porter (Seasonal) *Mechanicsburg, Pennsylvania*

- Worked with and informed multiple departments to ensure complete customer satisfaction.
- Exceeded customer and management expectations through the demonstration of strong work ethic and dedication.
- Performed a variety of customer services to maintain sales and relations.

Projects

Amazon Bargain Bot | *Python, MySQL, Kubernetes, DockerHub* **January 2024 – May 2024**

- Developed a bot using Python, MySQL, and HTML/CSS to search and display top-rated and reasonably-priced results from Amazon.
- Implemented Selenium to create an instance of Google Chrome to interact and return the correct elements of the web page.
- Created a MySQL database to store and sort the information received from the bot.
- Utilized Kubernetes to instantiate images as containers using a CloudLab resource cluster.

MiniJava-Based Compiler | *Java, Maven, Assembly* **August 2023 – December 2023**

- Created a Compiler for a MiniJava-based language called Ram23.
- Scanned, parsed, semantically analyzed, and generated assembly code for Ram23 using Java.
- Utilized IntelliJ and Maven to clean, compile, and test source code for the compiler.

Technical Skills

Languages: Java, Python, C, HTML/CSS, MySQL, Assembly, Haskell
Developer Tools: VS Code, IntelliJ, Maven, Eclipse
Technologies/Frameworks: Linux, GitHub, Kubernetes, DockerHub

Leadership / Extracurricular

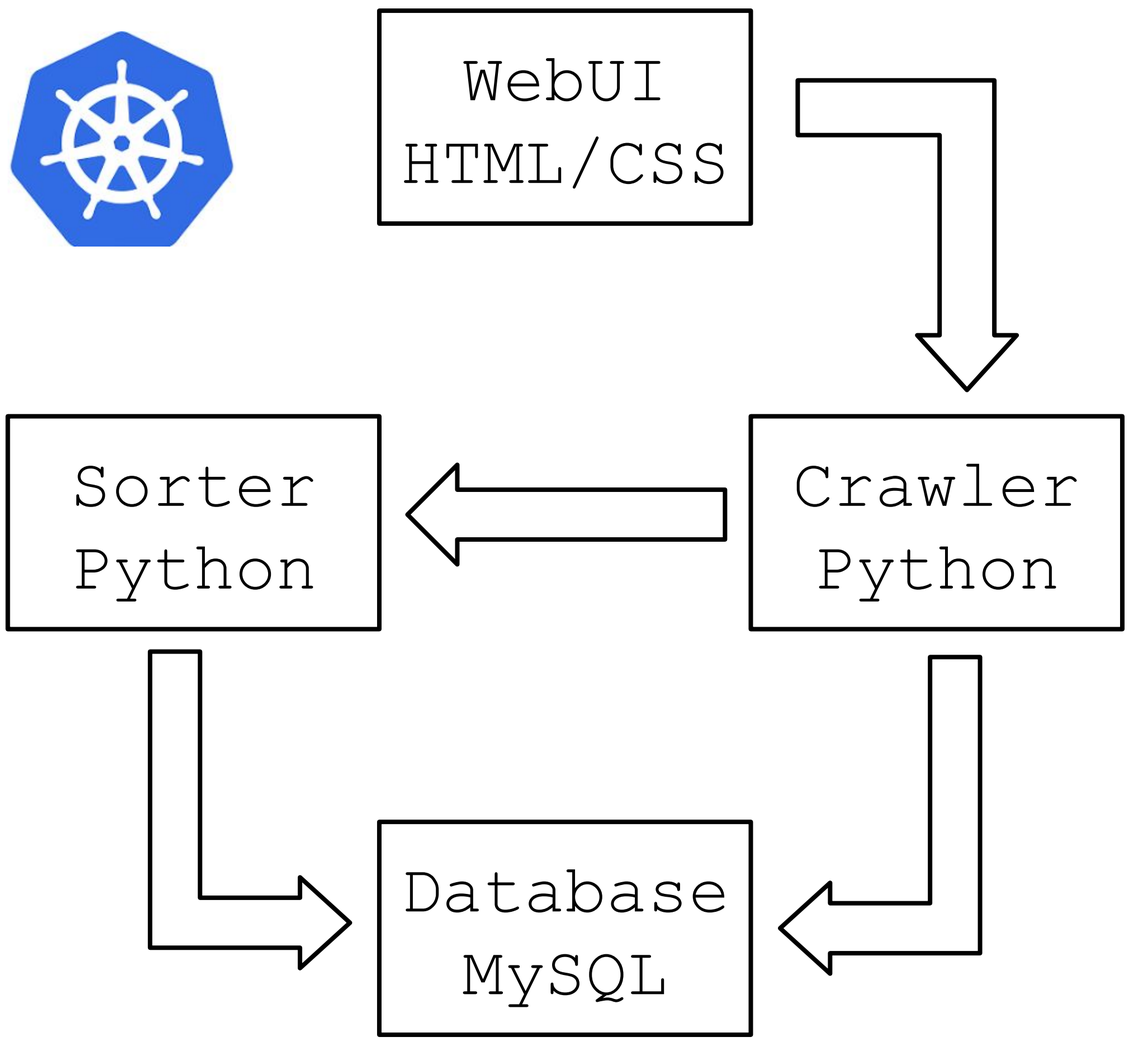
Competitive Programming Club **August 2023 – May 2024**
Secretary *West Chester University of Pennsylvania*

- Hosted an award-winning university-wide programming competition.
- Informed members of club activities and events through the use of flyers and announcements.
- Recruited Computer Science and related majors utilizing various methods during recruitment campaigns.

Amazon Bargain Bot

Abigail Clemens
James Park
Steven Wetten
HaoLun Zhang

https://github.com/StevenWetten/Amazon_Bargain_Bot.git



WebUI: The WebUI is a HTML/CSS web deployment that will display relevant information to the user via an HTTP connection. It will also prompt the user to enter a search term to be sent (GET) to Worker 1 for product searches.

Worker 1: Worker 1 is essentially a python web scraper that has been containerized. Using user input from the WebUI, the python script will establish a connection with Amazon and search for related items. It will then retrieve the description, rating, number of reviews, and URL of each item. It will sort this information into a csv file and, through a TCP connection, turn this csv file into a table in the MySQL Database. Finally, it will seek input from Worker 2 to return to the WebUI.

Worker 2: Worker 2 is, like Worker 1, a containerized python script. This script is used solely for interaction with the MySQL Database. It will establish a TCP connection with the Database and pull all prices from the table created by Worker 1. After finding the average of all prices, it will pull and compile the URL of all items in the MySQL table that are at or below that price and have a rating at or above 4 out of 5 stars. It will return this compilation to Worker 1. Finally, to preserve space, it will delete the table.

Database: The Database is a MySQL server that will store data from Worker 1 and return specific portions of this data to Worker 2.