

Edward Garcia

CS499-17487-Computer Science Capstone

3-2 Milestone: Enhancement 1-Software Design & Engineering Narrative

Professor Krupa

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### 3-2 Milestone: Enhancement 1 Narrative

The artifact I am presenting is the revised version of my Animal Shelter Dashboard. My app is a web-based application built for managing animal rescue data. Originally I developed the application as part of my CS340 course. My enhanced version features significant updates focused on software design and engineering. The enhancements I implemented include improvements to the user interface (UI), the addition of unit testing, and the integration of logging to verify transparency and maintainability of the system. I also adjusted the code to be more professional with an added header and structured comments.

I chose to include my Animal Shelter artifact in my ePortfolio because it serves as a clear representation of my skills and abilities in software development, specifically focusing on software engineering principles. By showcasing my ability to effectively update and enhance a working software product, I can demonstrate my competence in both building and refining solutions that meet real-world needs. The specific enhancements made to the artifact highlight my expertise in three important areas: user interface design, testing, and debugging. For instance, the updated UI leverages many Dash Bootstrap components to create a more modern, intuitive interface that caters to a broad audience of end users. I also added search functionality in the navigation bar, a "Refresh Data" button, a download feature, as well as About Us and Contact Us sections. Together, these changes provide a more engaging, user-friendly experience.

Unit testing was an important enhancement for me so that I can verify software reliability. I created comprehensive unit tests in a newly created file called (test\_animal\_shelter.py) to verify CRUD operations and I also covered edge cases such as invalid input and non-existent records. This testing strategy reflects my commitment to producing professional-grade software that is strong and dependable. My addition of logging further helps

maintain software quality by allowing easier monitoring and troubleshooting of events, making it simpler to track user actions and diagnose issues as they occur.

The enhancements I made align strongly with the course outcomes and showcase a range of essential skills in computer science. The redesign of the UI aligns with Outcome 2, demonstrating my ability to create professional-quality, user-centered visual communications tailored to diverse audiences, incorporating elements like a search bar and refresh button for enhanced usability. Additionally, these UI/UX updates align with Outcome 1 by fostering a collaborative environment that enables diverse audiences to interact with the system effectively, improving accessibility and supporting decision-making through features like an intuitive interface and clear navigation. The integration of unit testing and logging aligns with Outcome 4, highlighting my use of innovative tools and techniques to ensure reliable and maintainable software solutions. These features validate data integrity and enable effective monitoring, reflecting industry standards. Furthermore, the enhancements address Outcome 5, showcasing a security mindset by implementing data validation and error handling to mitigate vulnerabilities and ensure the application's integrity and reliability. Together, these updates demonstrate my commitment to delivering scalable, secure, and user-friendly software solutions.

Below is a screenshot of my Animal Shelter app in its original form:



rec_num	age_upon_outcome	animal_id	animal_type	breed	color	date_of_birth	datetime	monthyear	name	outcome_subtype	outcome_type
1	3 years	A746874	Cat	Domestic Shorthair Mix	Black/White	2014-04-10	2017-04-11 09:00:00	2017-04-11T09:00:00		SCRIP	Transfer
2	1 year	A725717	Cat	Domestic Shorthair Mix	Silver Tabby	2015-05-02	2016-05-06 10:49:00	2016-05-06T10:49:00		SCRIP	Transfer
3	2 years	A736330	Dog	Chihuahua Shorthair Mix	Brown/White	2013-11-18	2015-12-28 18:43:00	2015-12-28T18:43:00	Frank		Adoption
4	7 months	A736553	Cat	Siamese Mix	Seal Point	2016-01-25	2016-08-27 18:11:00	2016-08-27T18:11:00	Kitty		Adoption
5	2 years	A691584	Dog	Labrador Retriever Mix	Tan/White	2012-11-06	2015-05-30 13:48:00	2015-05-30T13:48:00	Luke		Return to Owner
6	5 years	A696004	Dog	Cardigan Welsh Corgi Mix	Sable/White	2010-01-27	2015-01-28 10:39:00	2015-01-28T10:39:00	Lucy	Rabies Risk	Euthanasia
7	2 years	A673830	Dog	Pit Bull Mix	Black/White	2012-03-03	2014-03-19 15:15:00	2014-03-19T15:15:00	Seth	Aggressive	Euthanasia
8	1 year	A736551	Dog	Labrador Retriever/Australian Cattle Dog	Black	2015-10-12	2016-11-27 18:00:00	2016-11-27T18:00:00	*Mia		Adoption
9	3 years	A720214	Dog	Labrador Retriever Mix	Red/White	2013-02-04	2016-02-11 12:41:00	2016-02-11T12:41:00	Blessing		Adoption
10	3 months	A664290	Cat	Domestic Shorthair Mix	Tortie	2013-09-01	2013-12-08 14:58:00	2013-12-08T14:58:00	*Taylor		Adoption

Below are screenshots of my Revised Animal Shelter app with added enhancements:

The screenshot shows the EJG's Animal Shelter app interface. The header includes the app name, navigation links (About Us, Contact Us), and a search bar. A central logo features a dog's head with the text "GUAYASO SALVARE". The main content area is divided into two sections: "Filter Options" on the left and "Animal Data" on the right.

**Filter Options:**

- ☐ Water Rescue
- ☐ Mountain Rescue
- ☐ Disaster Rescue
- ☒ Reset

Buttons: Refresh Data, Download Data

**Animal Data Table:**

rec_num	age_upon_outcome	animal_id	animal_type	breed	color	date_of_birth
1	3 years	A746874	Cat	Domestic Shorthair Mix	Black/White	2014-04-10
2	1 year	A725717	Cat	Domestic Shorthair Mix	Silver Tabby	2015-05-02
3	2 years	A716330	Dog	Chihuahua Shorthair Mix	Brown/White	2013-11-18
4	7 months	A733653	Cat	Siamese Mix	Seal Point	2016-01-25
5	2 years	A691584	Dog	Labrador Retriever Mix	Tan/White	2012-11-06
6	5 years	A696004	Dog	Cardigan Welsh Corgi Mix	Sable/White	2010-01-27
7	2 years	A673830	Dog	Pit Bull Mix	Black/White	2012-03-03
8	1 year	A736551	Dog	Labrador Retriever/Australian Cattle Dog	Black	2015-10-10

The screenshot shows the EJG's Animal Shelter app interface. The header includes the app name, navigation links (About Us, Contact Us), and a search bar. A central logo features a dog's head with the text "GUAYASO SALVARE". The main content area is divided into two sections: a list of percentages on the left and a map on the right.

**Percentages List:**

- 0.73%
- 0.71%
- 0.65%
- 0.63%
- 0.62%
- 0.62%
- 0.61%
- 0.6%
- 0.58%
- 0.57%
- 0.54%
- 0.53%
- 0.5%
- 0.41%
- 0.39%

**Map:** A map showing the location of the shelter, with labels for "Georgetown", "Hutto", "Taylor", "Leander", "Cedar Park", and "Lealito".

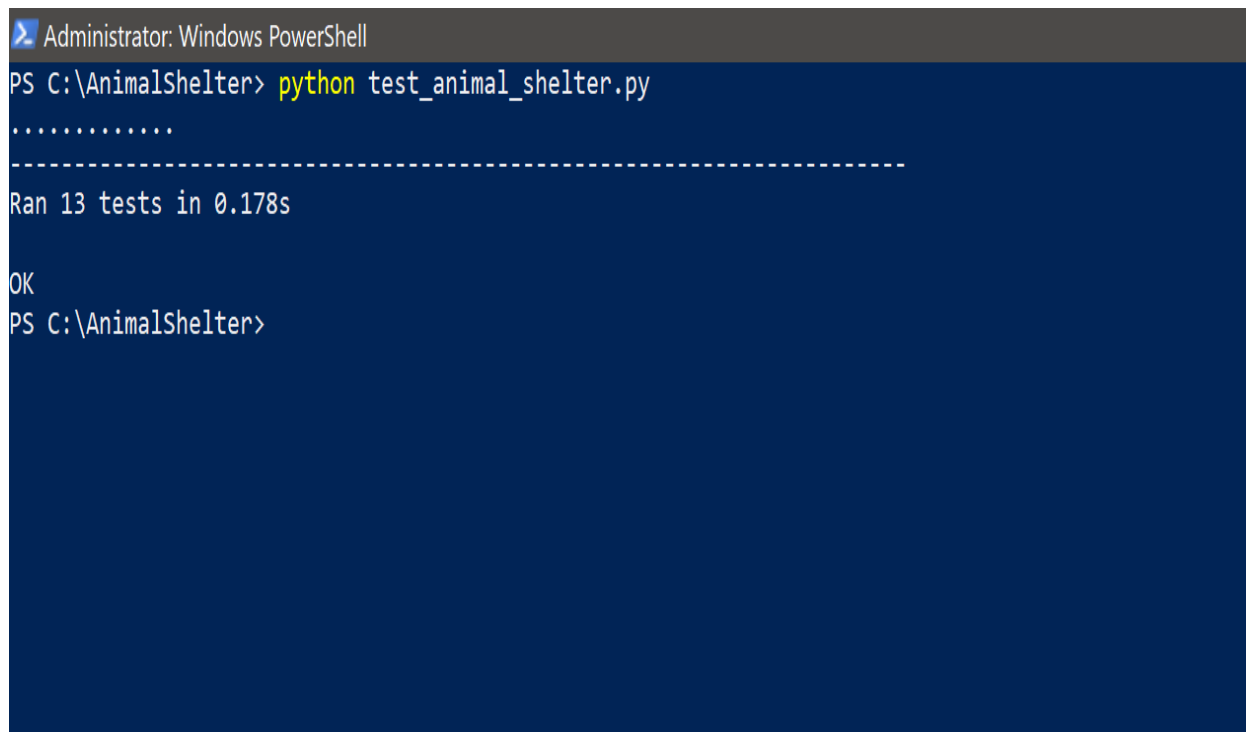
**About Us:**

At EJG's Animal Shelter, our mission is to support and enhance animal rescues by providing a powerful, user-friendly dashboard application. The Animal Shelter Dashboard was created to help rescue centers, animal caregivers, and adoption facilitators manage and analyze rescue animal data more effectively. We have crafted this platform to simplify data tracking, make animal information more accessible, and ensure a smoother rescue and adoption process. Our solution allows users to visualize data, filter records based on specific criteria such as breed or rescue type, and even pinpoint animal locations on an interactive map. By integrating these features, we empower our partners—whether rescue teams, volunteers, or potential adopters—to make informed decisions and work more efficiently. This dashboard, developed by Edward Garcia, leverages modern tools and technologies to ensure data is accurate, secure, and easy to interact with. We continuously work on improving the application to create a meaningful difference in the lives of rescued animals, and provide a transparent, organized view for all involved in the animal adoption journey. Our ultimate goal is to promote the welfare of animals by leveraging technology to enhance collaboration, efficiency, and, ultimately, the rate of successful adoptions. Thank you for being part of our journey to help animals find loving homes.

**Contact Us:**

For more information, please contact Edward Garcia at [edward@example.com](mailto:edward@example.com).

Below is a photo of the added unit testing passing 13 tests I created.

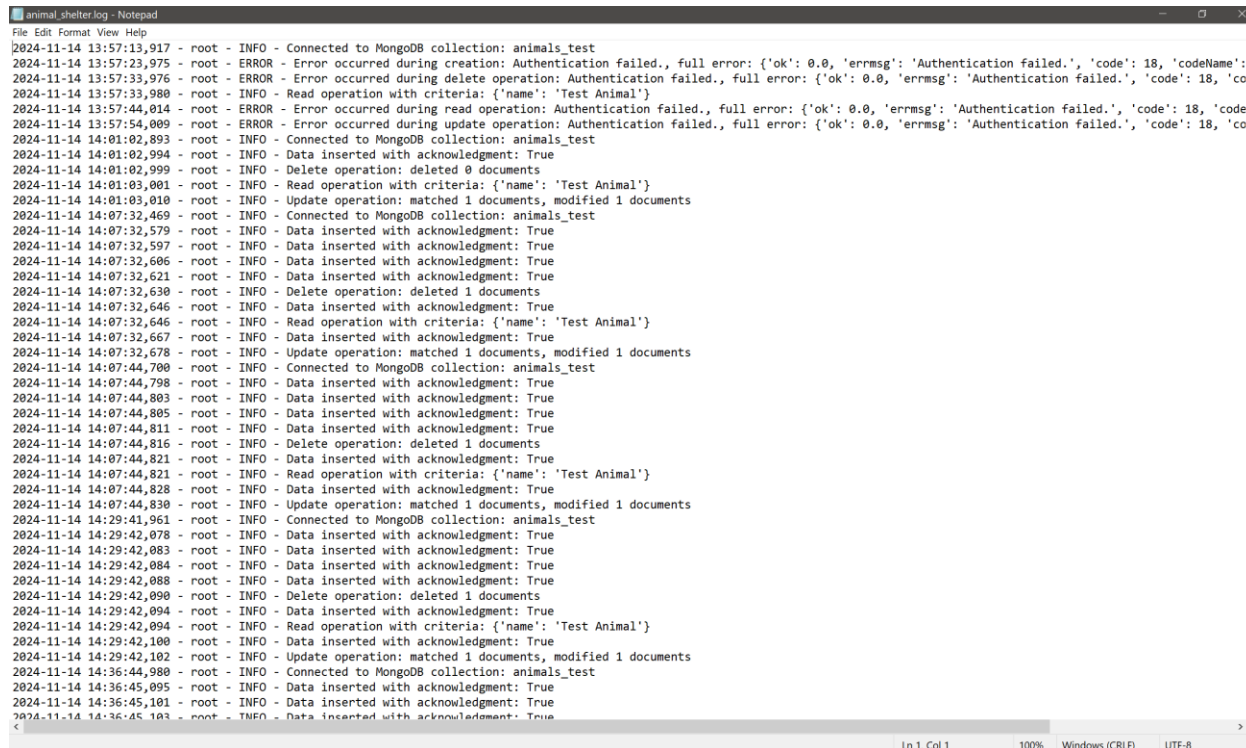


```

Administrator: Windows PowerShell
PS C:\AnimalShelter> python test_animal_shelter.py
.....
-----
Ran 13 tests in 0.178s

OK
PS C:\AnimalShelter>
  
```

Below is a photo of the enhanced logging I implemented:



```

animal_shelter.log - Notepad
File Edit Format View Help
2024-11-14 13:57:13,917 - root - INFO - Connected to MongoDB collection: animals_test
2024-11-14 13:57:23,975 - root - ERROR - Error occurred during creation: Authentication failed., full error: {'ok': 0.0, 'errmsg': 'Authentication failed.', 'code': 18, 'codeName': 'AuthenticationFailed'}
2024-11-14 13:57:33,976 - root - ERROR - Error occurred during delete operation: Authentication failed., full error: {'ok': 0.0, 'errmsg': 'Authentication failed.', 'code': 18, 'codeName': 'AuthenticationFailed'}
2024-11-14 13:57:33,988 - root - INFO - Read operation with criteria: {'name': 'Test Animal'}
2024-11-14 13:57:44,014 - root - ERROR - Error occurred during read operation: Authentication failed., full error: {'ok': 0.0, 'errmsg': 'Authentication failed.', 'code': 18, 'codeName': 'AuthenticationFailed'}
2024-11-14 13:57:54,009 - root - ERROR - Error occurred during update operation: Authentication failed., full error: {'ok': 0.0, 'errmsg': 'Authentication failed.', 'code': 18, 'codeName': 'AuthenticationFailed'}
2024-11-14 14:01:02,994 - root - INFO - Connected to MongoDB collection: animals_test
2024-11-14 14:01:02,994 - root - INFO - Data inserted with acknowledgment: True
2024-11-14 14:01:02,999 - root - INFO - Delete operation: deleted 0 documents
2024-11-14 14:01:03,001 - root - INFO - Read operation with criteria: {'name': 'Test Animal'}
2024-11-14 14:01:03,010 - root - INFO - Update operation: matched 1 documents, modified 1 documents
2024-11-14 14:07:32,469 - root - INFO - Connected to MongoDB collection: animals_test
2024-11-14 14:07:32,579 - root - INFO - Data inserted with acknowledgment: True
2024-11-14 14:07:32,597 - root - INFO - Data inserted with acknowledgment: True
2024-11-14 14:07:32,606 - root - INFO - Data inserted with acknowledgment: True
2024-11-14 14:07:32,621 - root - INFO - Data inserted with acknowledgment: True
2024-11-14 14:07:32,638 - root - INFO - Delete operation: deleted 1 documents
2024-11-14 14:07:32,646 - root - INFO - Data inserted with acknowledgment: True
2024-11-14 14:07:32,646 - root - INFO - Read operation with criteria: {'name': 'Test Animal'}
2024-11-14 14:07:32,667 - root - INFO - Data inserted with acknowledgment: True
2024-11-14 14:07:32,678 - root - INFO - Update operation: matched 1 documents, modified 1 documents
2024-11-14 14:07:44,700 - root - INFO - Connected to MongoDB collection: animals_test
2024-11-14 14:07:44,798 - root - INFO - Data inserted with acknowledgment: True
2024-11-14 14:07:44,803 - root - INFO - Data inserted with acknowledgment: True
2024-11-14 14:07:44,805 - root - INFO - Data inserted with acknowledgment: True
2024-11-14 14:07:44,811 - root - INFO - Data inserted with acknowledgment: True
2024-11-14 14:07:44,816 - root - INFO - Delete operation: deleted 1 documents
2024-11-14 14:07:44,821 - root - INFO - Data inserted with acknowledgment: True
2024-11-14 14:07:44,821 - root - INFO - Read operation with criteria: {'name': 'Test Animal'}
2024-11-14 14:07:44,828 - root - INFO - Data inserted with acknowledgment: True
2024-11-14 14:07:44,830 - root - INFO - Update operation: matched 1 documents, modified 1 documents
2024-11-14 14:29:41,961 - root - INFO - Connected to MongoDB collection: animals_test
2024-11-14 14:29:42,078 - root - INFO - Data inserted with acknowledgment: True
2024-11-14 14:29:42,083 - root - INFO - Data inserted with acknowledgment: True
2024-11-14 14:29:42,084 - root - INFO - Data inserted with acknowledgment: True
2024-11-14 14:29:42,088 - root - INFO - Data inserted with acknowledgment: True
2024-11-14 14:29:42,090 - root - INFO - Delete operation: deleted 1 documents
2024-11-14 14:29:42,094 - root - INFO - Data inserted with acknowledgment: True
2024-11-14 14:29:42,094 - root - INFO - Read operation with criteria: {'name': 'Test Animal'}
2024-11-14 14:29:42,100 - root - INFO - Data inserted with acknowledgment: True
2024-11-14 14:29:42,102 - root - INFO - Update operation: matched 1 documents, modified 1 documents
2024-11-14 14:36:44,980 - root - INFO - Connected to MongoDB collection: animals_test
2024-11-14 14:36:45,095 - root - INFO - Data inserted with acknowledgment: True
2024-11-14 14:36:45,101 - root - INFO - Data inserted with acknowledgment: True
2024-11-14 14:36:45,103 - root - INFO - Data inserted with acknowledgment: True
  
```

Reflecting on my enhancement process, I learned the importance of continuous iteration when it comes to software design. Designing a user-friendly UI required understanding the point of view of the end-user. Unit testing pushed me to think critically about how my software could fail and how to handle those scenarios efficiently. The major challenge I faced was making sure that the new components, such as the search functionality, integrated seamlessly with the existing elements without introducing bugs or disrupting the flow of the application. However, through some trial and error and a disciplined approach to testing, I was able to overcome these challenges and deliver an enhanced version of the software that is now reliable and scalable.

This experience has strengthened my ability to take a more general approach to software engineering by focusing on feature development, usability, maintainability, and efficiency. The inclusion of the artifact in my ePortfolio will demonstrate my growth as a software engineer and will reflect my commitment to delivering successful software solutions that provide real value to users.