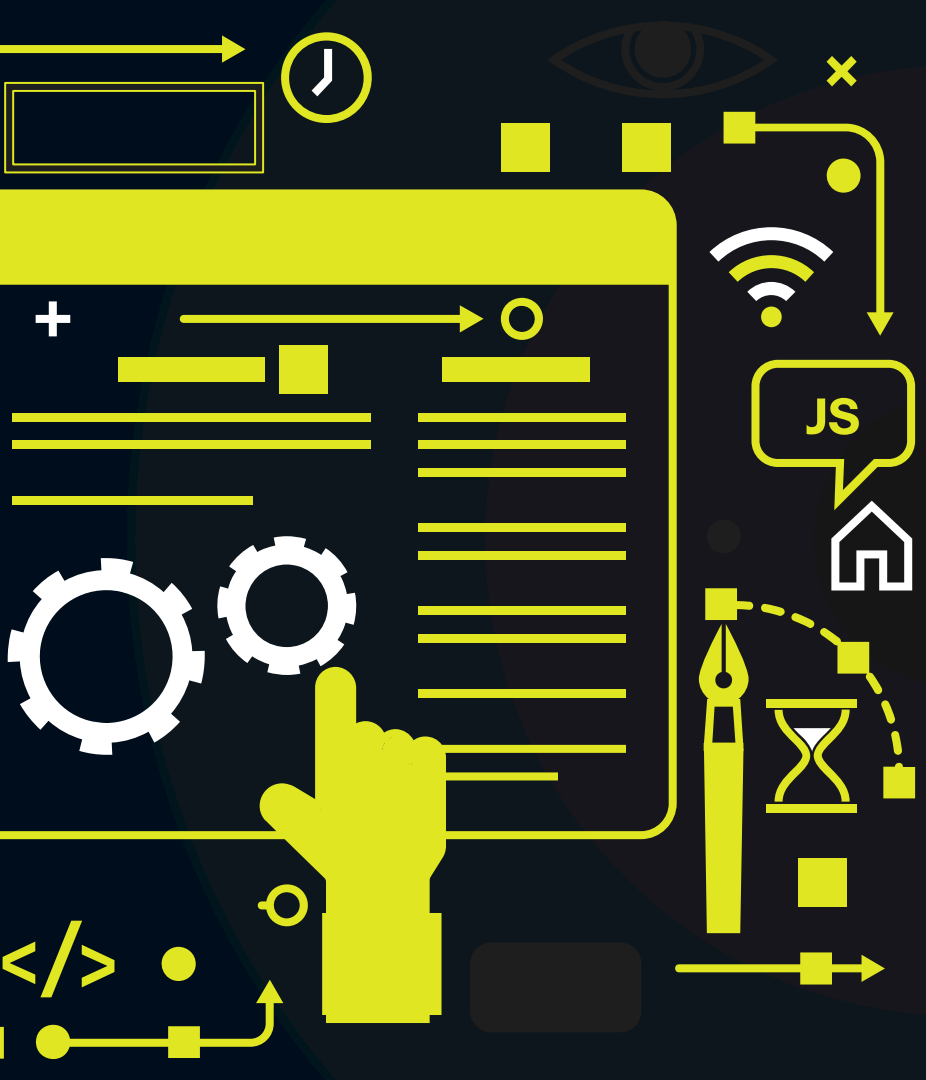

Docker and Containerization

A CLAO SWAT Project

M&T Tech

TABLE OF CONTENTS

{ ABOUT THE PROJECT }

We need to automatically containerize our department's web applications, which would allow finely tuned environments tailored to those specific web applications to be portably deployed via *GitLab* CI/CD pipelines.

We seek to utilize Docker, a tool/platform that is used to automate the deployment of applications in lightweight containers so that applications can work efficiently in different environments in isolation.

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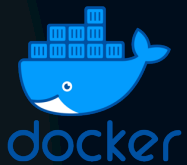
{THE TECH STACK}



Web Application

CI/CD Pipeline

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{ CURRENT SOLUTION }

- LONG MAINTENANCE TIMES
- REQUIRES OFF PEAK HOURS
- LACK OF ADAPTABILITY

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{ PROJECT GOALS }

Create a Docker container that is capable of self hosting a .NET 6 web-app

CI/CD to AUTOMATICALLY deploy container to designated environment

Migrate one real time application to a Docker container on OpenShift

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{OUR GOALS}

Automation

Our containerization allows any new or existing application to be put through a pipeline, stored on the *Artifactory*, and deployed on *OpenShift* within a container **without additional manual intervention.**

Scalability

This process can **easily be replicated or scaled** across any web application by utilizing documentation that will be created following the completion of this project.

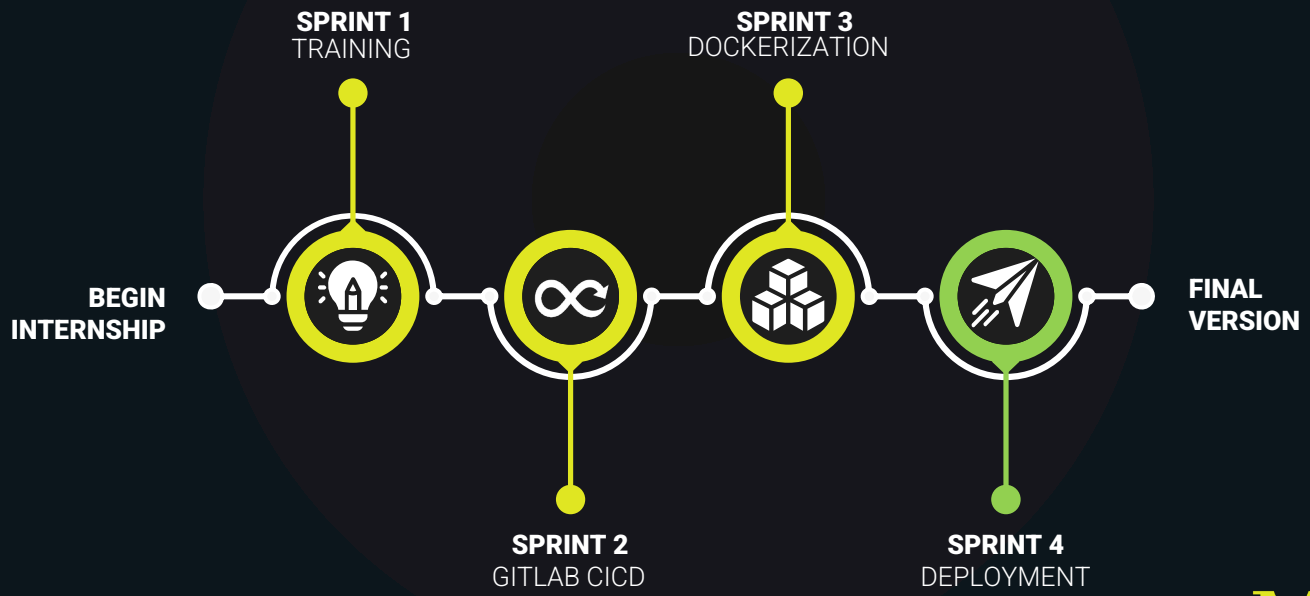
Cost Reduction

Assuming an average combined developer salary and operational cost of $85, the cost for a resource that requires 10 hours of maintenance per month is:

$$10\ hours \times \$85 = \$850\ per\ developer$$

If we continue to scale this with more developers working on a resource and multiple resources being maintained by different teams, the cost rises quite substantially.

{OUR TIMELINE}



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{ CHALLENGES }

Project Structure

Seeing that the project requires lots of stages and moving parts, understanding the structure of the project was a major challenge.

In order to overcome this, we spent time diagramming our idea of the structure and got verification from our lead, Anthony Steiner.

Tech Stack

As our team had very little experience with the technologies needed to complete this project, we spent a significant amount of time learning on Pluralsight.

Pluralsight allowed us to quickly overcome the learning curve of trying to understand new technologies and allowed us to make quick advances once we started the project.

Controller Endpoints

While reconfiguring a sample application into the current state, data from the .NET controller never reached the frontend.

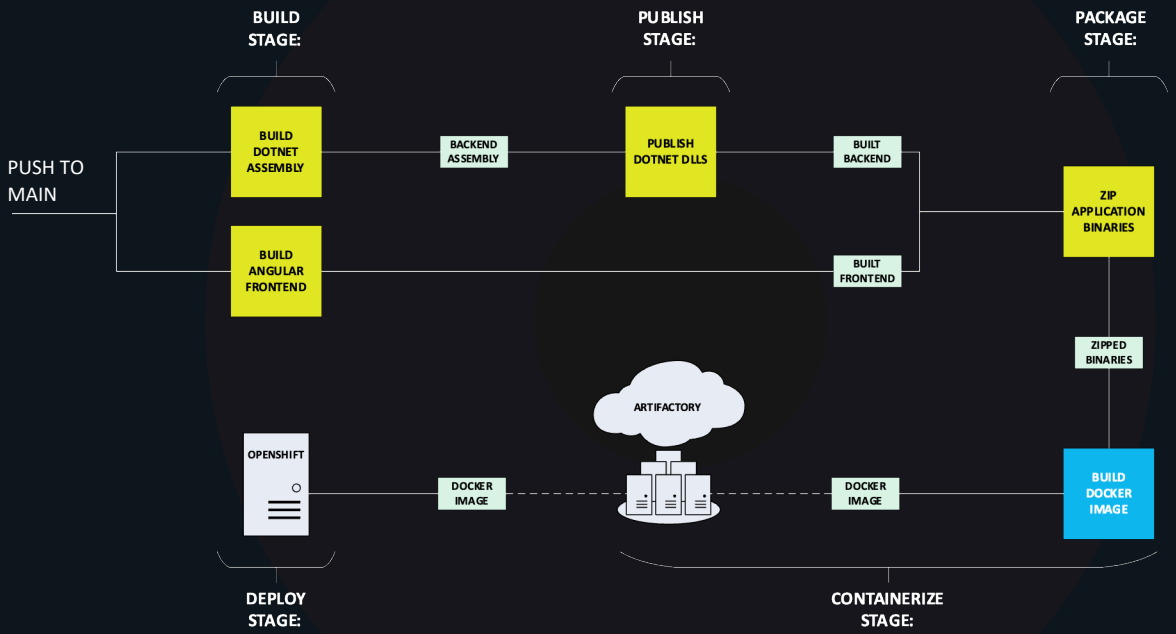
Addressing this issue require collaboration with our lead Anthony Steiner and co-lead Rishi Joshi, immense research into C# controllers, and the use of swagger to ensure that the endpoints indeed existed.

Initial Docker Build

Converting the application to run inside the docker container was challenging. As currently M&T uses windows specific dependencies for authentication. Where as OpenShift only allows Linux images.

To address this, we will offload the Windows authentication to an external application and make use of Kestrel for HTTPS.

{PIPELINE}



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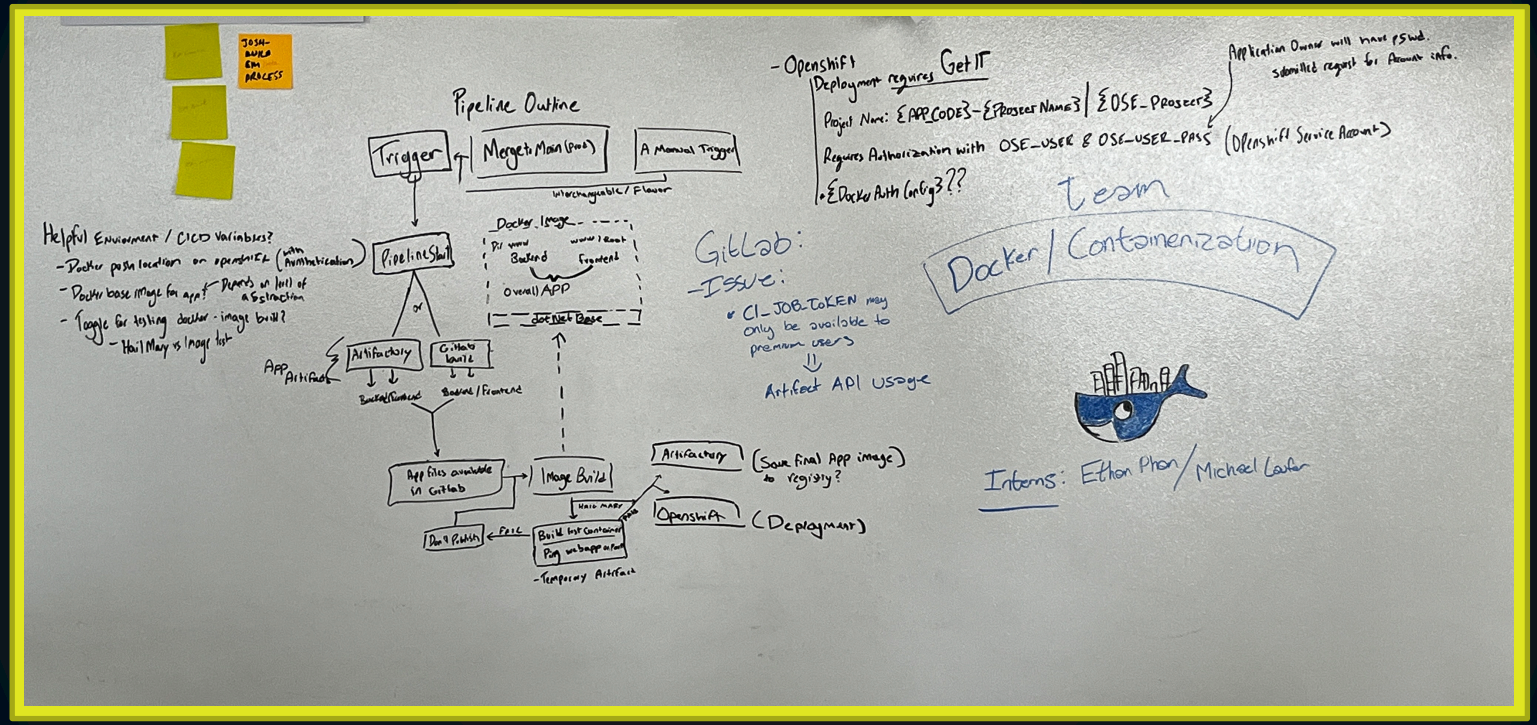
{ ORIGINAL PIPELINE }



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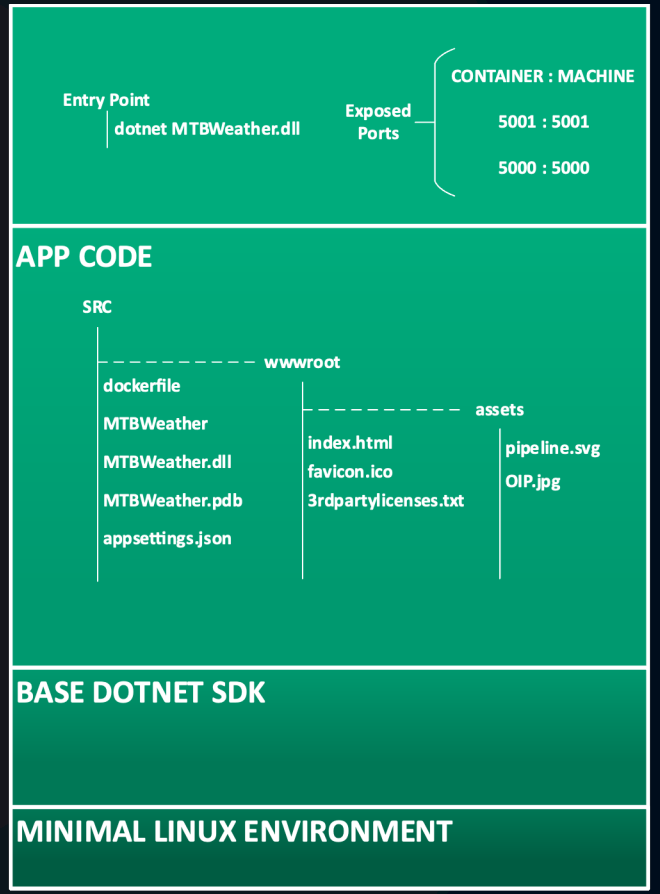
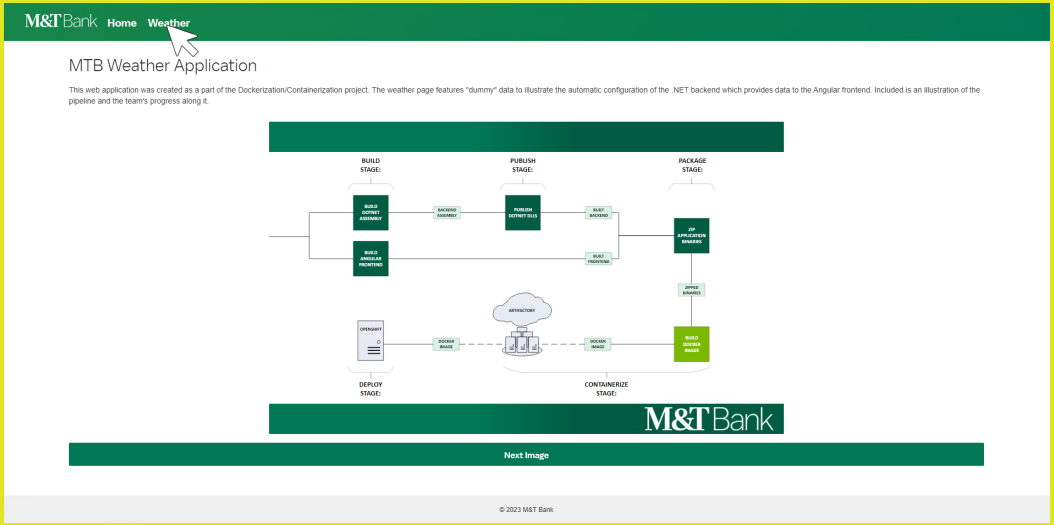
{ DOCKER IMAGE }

- OS (in this case a minimal Linux environment) is handled by *Docker Daemon*
- Base dotnet SDK handles the running of application (using an internal Artifactory docker image as the base)
- App code is the *application binaries* which is copied into the *Docker* image's working directory
- The image has ports 5000/5001 exposed and mapped to the same ports externally, for **http** and **https** respectively



{ SNEAK PEEK }

Angular frontend built from *Docker* container



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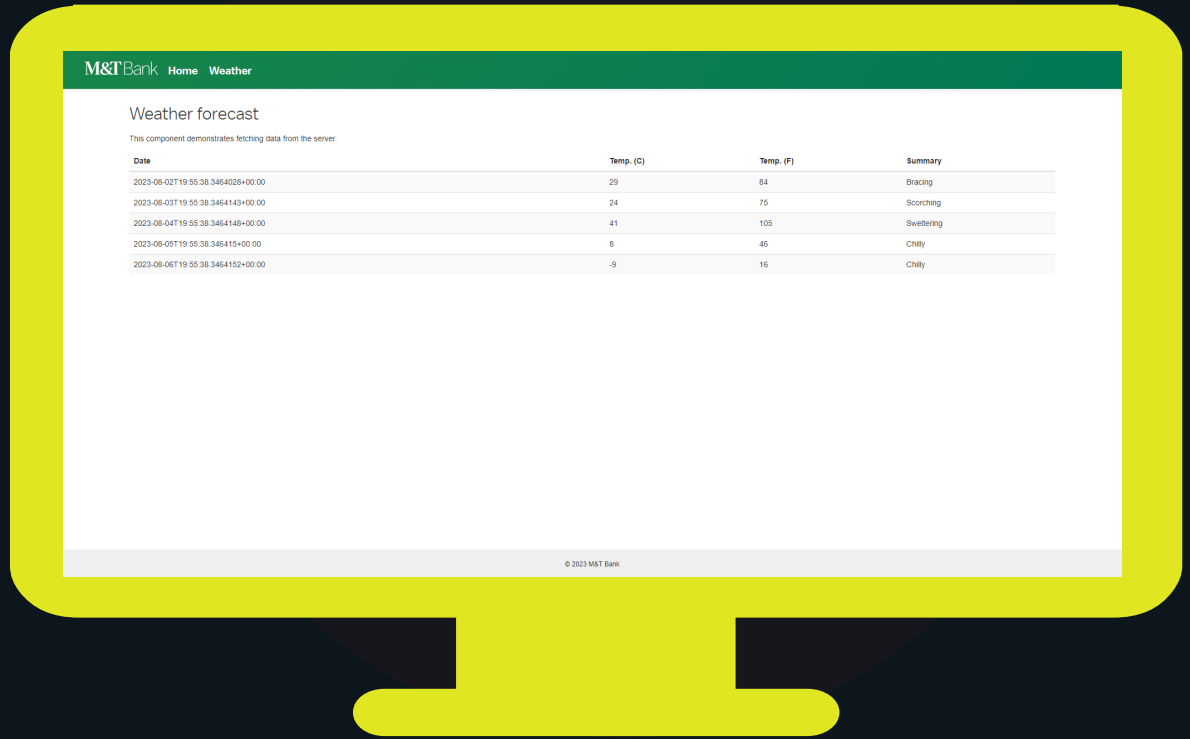
{ SNEAK PEEK }



Working .NET backend sending “data” within *Docker* container

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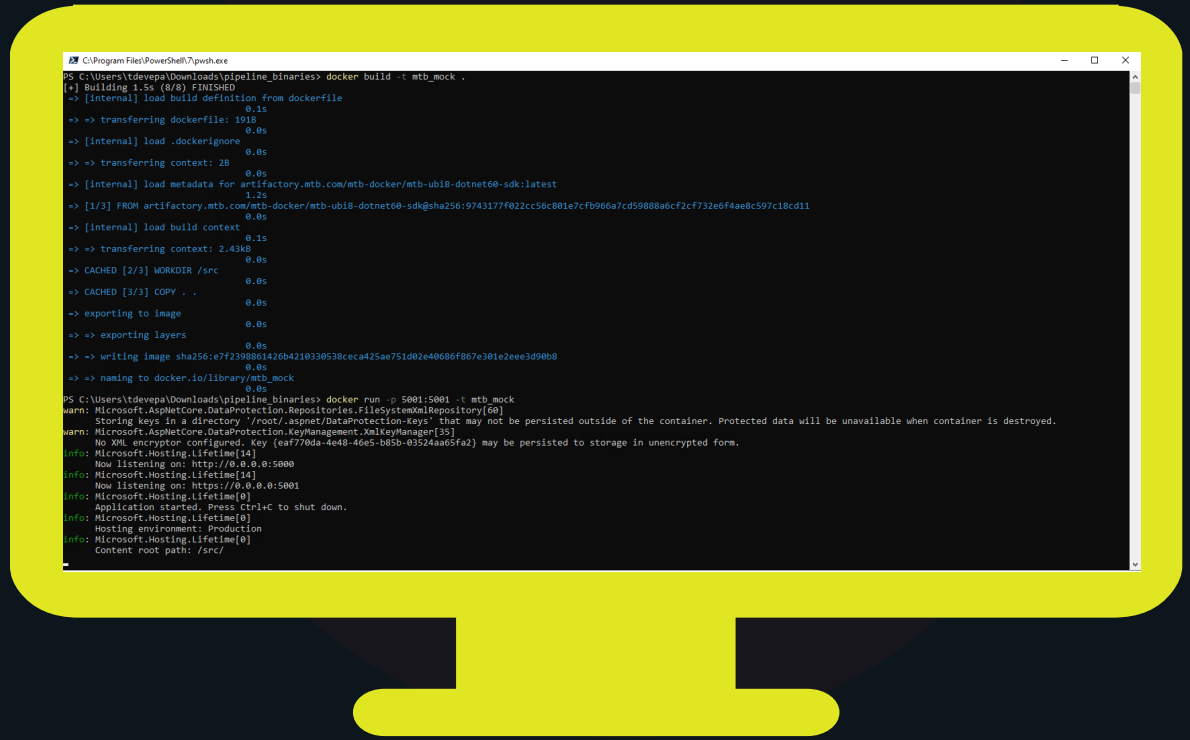
{ SNEAK PEEK }

Running *Docker* container



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{ THE TEAM }

Ethan Le Phan

TIP Intern, rising junior at University at Buffalo

Michael Laufer

TIP Intern, rising senior at University at Buffalo

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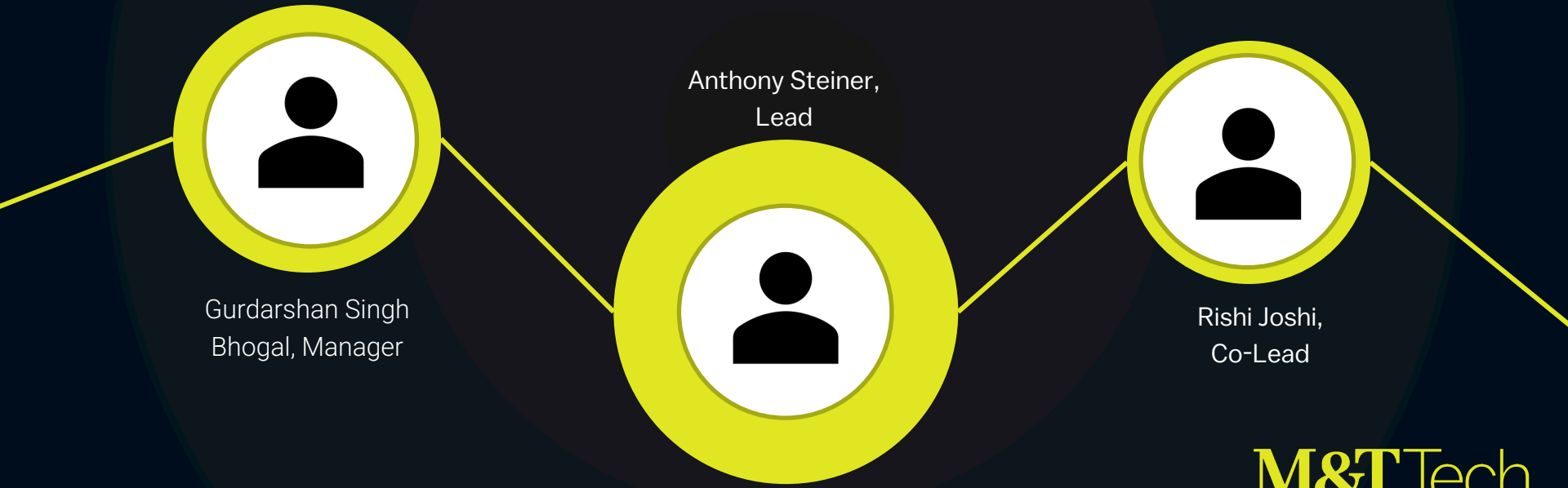
{OUR MENTORS}



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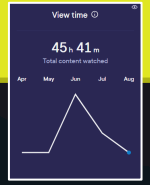
{TAKEAWAYS}

ETHAN PHAN

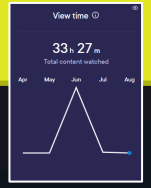
From building the mock Angular/.NET applications to designing GitLab pipelines, working on this project allowed me to learn about various aspects of software development. I am grateful to be given the opportunity to expand my tech stack, obtain relevant experience, and connect with others working to achieve the same goals.



TESTIMONIES

MICHAEL LAUFER

This project was my first time experiencing the full suite of DevOps in a professional setting. I gained experience creating my own CI/CD pipelines to not only build an application, but to completely automate the construction of a docker image, and to research processes within the bank to utilize docker for deployment purposes.



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{ PROJECT RESOURCES }

Confluence

GitLab

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THANKS!

Feel free to ask questions! And Connect with us!

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Michael Laufer
https://www.linkedin.com/in/michaellaufer2/