

A REPORT

ON

**Project Boxy: Open Source GPU  
Remote Access & Development Suite**

BY

**JOEL TONY**

**2021A7PS2077G**

AT

**Coditation Systems**

**A Practice School – I Station of**



**BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE  
PILANI, GOA CAMPUS**

June 2023

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Prepared in partial fulfilment of  
the Practice School-I Course BITS F221

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**Abstract Sheet**  
**BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE,**  
**PILANI - (RAJASTHAN)**

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**Abstract**

This report is regarding Project Boxyy, that I am working on at Coditation Systems, Pune, as a part of my Practice School-I (BITS F221). The project involves the design and implementation of an open-source GPU remote access development suite.

**Signature of Student**

**Signature of PS Faculty**

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# Chapter 1

## Project Overview

### 1.1 Project Description

The project aims to develop an open-source sandbox environment for graphics payloads. It includes a WebRTC component for delivering graphics streams on the web, a native WebGPU component for real-time graphics rendering on the server, DevSync for real-time code editing, and a remote caching system for compiled resources.

### 1.2 Motivation Behind the Project

Project Boxy aims to provide affordable and accessible GPU resources to developers and researchers on resource-intensive tasks. High-end GPUs are expensive and out of reach for individuals and organizations. The project aims to address that challenge by offering a sandbox environment for developing and deploying graphics payloads.



## Chapter 2

# Project Requirements

### 2.1 Functional Requirements

#### 2.1.1 WebRTC

- Enable real-time delivery of graphics streams on the web.
- Support secure and efficient streaming of graphics data.
- Ensure compatibility with modern web browsers and platforms.

#### 2.1.2 WebGPU

- Develop a native component for real-time graphics rendering on the server using WebGPU.
- Support efficient and optimized graphics rendering techniques.
- Handle shader languages such as GLSL or SPIR-V.

#### 2.1.3 DevSync

- Enable real-time code editing, compilation, and hot reloading of the graphics viewport.
- Support a seamless development experience for developers working on graphics payloads.
- Integrate development tools and frameworks that facilitate live code updates and hot module replacement.

### 2.1.4 Compiler Infrastructure

- Implement remote caching of compiled resources to reduce the turnaround time for graphics compilation.
- Utilize distributed caching systems or cloud-based storage solutions for storing compiled resources.
- Optimize resource management and ensure efficient compilation processes.

### 2.1.5 Collaboration and Coherence

- Enable collaboration among developers and researchers working on the project.
- Utilize version control systems (e.g., Git) and project management tools (e.g., GitHub, Jira) for effective collaboration.
- Foster a coherent and collaborative end-to-end developer experience.

### 2.1.6 Open Source

- Follow open-source development practices and guidelines.
- Enable easy contribution from the community.
- Comply with open-source licenses and requirements.

### 2.1.7 Cloud Infrastructure

- Enable deployment of the remote access system using cloud-based infrastructure and services.
- Manage GPU resources efficiently within the cloud environment.
- Ensure scalability, reliability, and security of the cloud infrastructure.

### 2.1.8 Security

- Employ authentication and authorization mechanisms to control user access.
- Ensure secure remote access to the GPU-based applications.
- Protect sensitive data and prevent unauthorized access or data breaches.

### 2.1.9 Documentation and Testing

- Provide clear and comprehensive documentation for developers and users.
- Utilize testing frameworks and methodologies to ensure the reliability and quality of the applications.

## 2.2 Non-Functional Requirements

### 2.2.1 Performance

- Provide real-time graphics rendering and streaming with minimal latency.
- Optimize resource utilization for efficient compilation and caching processes.
- Support a scalable infrastructure to handle multiple concurrent users.

### 2.2.2 Usability

- Offer an intuitive and user-friendly interface for developers and researchers.
- Provide clear instructions and documentation for setup, configuration, and usage.
- Support seamless integration with popular development environments and tools.

### 2.2.3 Reliability

- Ensure high availability and uptime of the remote access system.
- Implement error handling and recovery mechanisms to handle exceptions and failures.
- Regularly monitor and maintain system stability and performance.

### 2.2.4 Security

- Implement robust security measures to protect user data and prevent unauthorized access.
- Follow security best practices and industry standards.
- Regularly update and patch the system to address security vulnerabilities.

### **2.2.5 Scalability**

- Support a growing user base and increasing demands for GPU resources.
- Scale the infrastructure seamlessly to handle additional users and workloads.
- Optimize resource allocation and management for scalability.

### **2.2.6 Compatibility**

- Support major web browsers and platforms for web-based delivery of graphics streams.
- Integrate with popular development tools and frameworks for code editing and compilation.
- Ensure compatibility with various operating systems and hardware configurations.

## Appendix A

## Appendix A

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## Appendix B

# Appendix B

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