

Web-based System for Ordering and Managing 3D Prints

Zehra Irem Kuyucu

Vilnius Gediminas Technical University
Faculty of Fundamental Sciences

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Aim: To develop a web-based platform automating 3D print ordering and management workflow.

Objectives:

- 1 Analyze existing 3D print ordering service workflows.
- 2 Identify automation opportunities.
- 3 Select appropriate technologies.
- 4 Develop functional implementation.

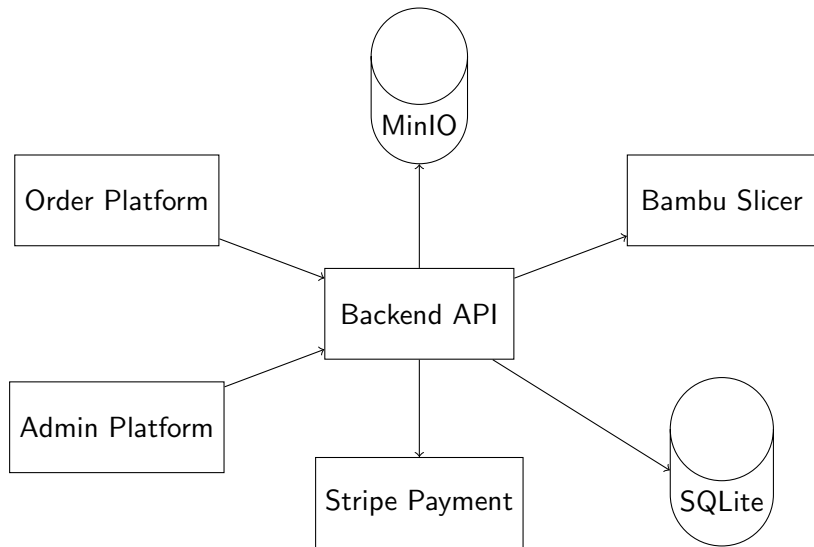
Current Market State:

- 3D printing technology rapidly advances and the community around it grows each year.
- Print ordering process involves back and forth communication. Vast majority of the companies don't automate.
- Existing automation is usually proprietary and made in-house.

Technical Challenges:

- Fragmented printer technologies.
- Closed APIs limiting integration.
- Complex file format requirements.

System Architecture



Frontend

- Real-time 3D preview
- Parameter configuration
- Cost estimation
- Order tracking

Backend

- Automated validation
- File processing
- Slicing integration
- Inventory management

User Interface - Order Platform

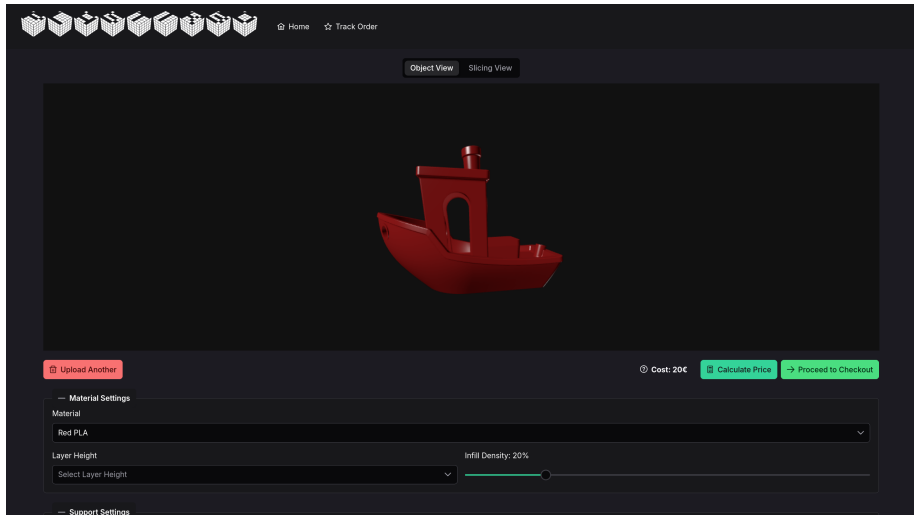


Figure: STL preview

User Interface - Order Platform

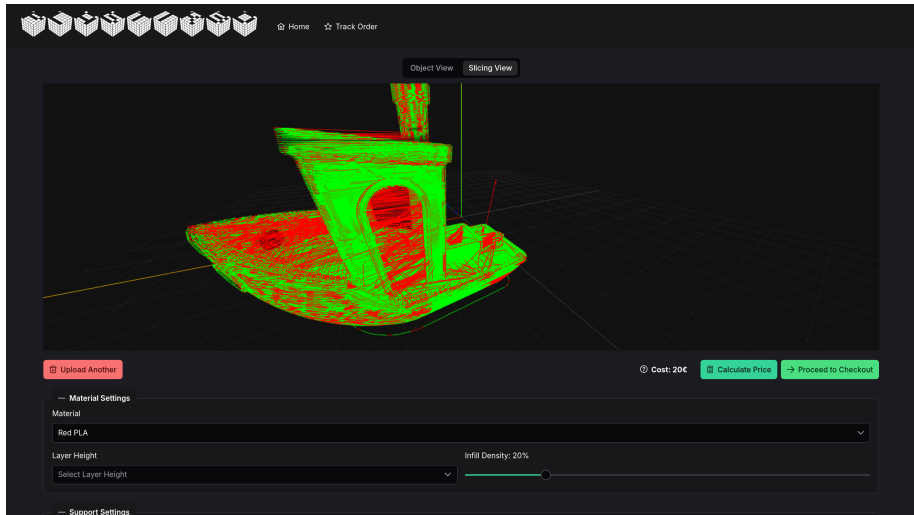


Figure: G-code preview

User Interface - Order Platform

The screenshot shows a user interface for tracking an order. At the top, there is a navigation bar with a home icon and a 'Track Order' link. Below this is a search bar with the placeholder text '# Enter Order ID' and a green 'Search' button. The main content area is titled 'Track Your Order' and is divided into three sections: 'Order Details', 'Print Configuration', and 'Order Timeline'. The 'Order Details' section shows the order ID: 550e8400-e29b-41d4-a716-446655440000. The 'Print Configuration' section is split into two columns of key-value pairs. The 'Order Timeline' section shows a vertical sequence of events: 'Order Received' (12/23/2024, 4:30:00 PM), 'Payment Confirmed' (12/23/2024, 4:31:00 PM), and 'Printing Started' (12/23/2024, 5:00:00 PM).

Home Track Order

Track Your Order

Enter Order ID Search

Order Details PRINTING

Order ID: 550e8400-e29b-41d4-a716-446655440000

Print Configuration

Material	Layer Height
Red PLA	0.2mm
Infill Density	Supports
20%	Yes
Brim	Est. Weight
No	125g
Est. Print Time	Cost
14h 30m	20€

Order Timeline

- Order Received
12/23/2024, 4:30:00 PM
- Payment Confirmed
12/23/2024, 4:31:00 PM
- Printing Started
12/23/2024, 5:00:00 PM

Figure: Order tracking

User Interface - Admin Platform

The screenshot displays a web-based admin platform interface for 3D printing orders. At the top, there is a navigation bar with a home icon and a 'Track Order' link. Below the navigation bar is a table listing orders. The table has columns for Order ID, Customer, Status, Price, and Created. A modal window titled 'Order Details' is open, showing customer information, print options, and status update buttons.

Order ID	Customer	Status	Price	Created
550e8400...	John Doe	new	\$24.50	3/15/2024, 11:30:00 AM
550e8400...	Jane Smith	past	\$35.75	3/15/2024, 12:15:00 PM
550e8400...	Bob Wilson			

Order Details

Customer Information
Name: John Doe
Email: john@example.com

Print Options
Material: PLA
Infill Density: 20%
Brim: No
Layer Height: 0.2mm
Supports: Yes

Files
Download STL Download 3MF Download G-code

Status Update
Start Printing Mark Complete Mark Failed

Figure: Web-based user interface of the administrator platform

- **Frontend:**

- Vue.js with TypeScript
- Three.js for 3D visualization
- Tailwind CSS

- **Backend:**

- Go (Golang)
- SQLite database
- MinIO object storage

Achievements:

- Automated workflow processes
- Vendor-independent architecture
- Real-time visualization and instant quotation

Validation:

- Unit testing coverage
- Integration testing
- User acceptance testing

System Extensions:

- Multi-vendor printer support
- Multi-user administration
- Distributed slicing architecture

Industry Recommendations:

- Standardize printer APIs
- Improve format compatibility
- Support automation features

Questions?