

# Ching-Cheong Lee

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## About Me

Graduated from HKUST with an M.Phil degree in Mathematics, worked in both academic and nonacademic fields, with solid knowledge in both frontend and backend programming.

I am passionate about designing software architecture, with rich experience in (i) delivering services with appropriate cloud infrastructure and (ii) building devops pipelines to facilitate team's collaboration.

## Experience

### Software Engineer

Mid of May 2023 ~ Present <sup>1.5 Years</sup>

Wonderbricks Limited, Hong Kong

- AWS. S3, Cloudfront, Lambda, EC2-loadbalancer, ECS-Fargate, Route53, API-Gateway, RDS
- Frontend. Vite, React, Redux-toolkit, React-Native, React-Native-Reanimated, Next, Expo-CLI, Algolia, Socket.io-client, RevenueCat, Push Notification for iOS and Android
- Backend. Express (Node.js), Spring Boot (Kotlin), JOOQ, JPA, Domain Driven Design, Prisma, Prisma-Kysely, Expo Push Notification, PostgreSQL, MongoDB, Socket.io, RabbitMQ, Redis, Stripe and Stripe's Event Integration
- DevOps. Github Actions, Automated: (1) Backend Deployment onto ECS; (2) Frontend Deployment onto S3 and Cloudfront; (3) Deployment of Lambda functions

#### Web Application (Mid-05/2023 to Mid-09/2023)

##### Frontend.

- Revamp and maintain an existing React project in Typescript

##### Backend.

- Maintain existing Spring Boot project in Java, build APIs by iBatis and mongo-java-driver

#### Mobile Application (Mid-09/2023 to Present)

##### Frontend.

- Developed a realtime text-messaging and LLM based project from scratch by React-Native and EXPO
- Created custom interactive components by React-Native-Reanimated
- Integrated RevenueCat in frontend

##### Backend and Infrastructure.

###### Database (PostgreSQL + MongoDB).

- Conducted schema migration via Prisma for dev and non-dev environments
- Managed user accounts by granting appropriate privileges in PostgreSQL database
- Used both PostgreSQL for business-centric data and MongoDB for complex json object resulted from LLM model
- Designed and adjusted tables in PostgreSQL to fulfill ever-changing requirements

###### Backend Project 1 (Nodejs Express, serving mobile and web applications).

- Decided to use query builder (Prisma-Kysely) instead of any existing ORMs, making the application readily maintainable by anyone who knows basic SQL
- Designed middleware to let user send text, audio, images via REST apis and broadcast the message via socket.io
- Developed Push notification system for ios and android
- Introduced the concept of domain objects, make clear distinction between a repository and a DAO
- Implemented an ApplicationEventPublisher (for DDD) with decorators: @listener, @order, @nextEvent. Listeners are registered with the help of reflect-metadata.

###### Backend Project 2 (Kotlin Spring Boot, one serving mobile and one serving payment).

- Integrated with Stripe and RevenueCat for purchasing in-app resources in our applications, integration includes:
  - Subscribe, upgrade, downgrade and cancel the monthly plans
  - Distribute purchased in-app resources to team members

## Blog

<https://machingclee.github.io/blog>

## Portfolio

<https://machingclee.github.io/portfolio>

## Education

### MicroMaster in A.I. and Programming

Tecky Academy

Mar 2019 ~ June 2019

### M.Phil. in Mathematics

The Hong Kong University of Science and Technology

Sep 2012 ~ Aug 2014

### B.Sc. in Mathematics

Pure Math Option, 1st Class Honor

The Hong Kong University of Science and Technology

Sep 2009 ~ June 2012

## Skills

### Source Control

Git

### Deployment

Docker, Github Actions

### Cloud (AWS)

Security Group, Target Group, Load Balancer, ECS Fargate, Route53, S3, CloudFront, Lambda Functions, API-Gateway, RDS, SQS

### Typescript

React, React-Native, Redux, Redux-Saga, Next.js, Electron.js, Electron with Next.js, Node.js, Express.js, Socket.io, Twilio.js, Knex.js, Mongoose.js, Prisma.js, Prisma-Kysely.js

### Kotlin

Spring Boot, JPA, JOOQ, Domain Driven Design, JUnit 5

### Golang

Gin, Goose, Sqlc, Azure-sdk for Voice, Go-Jet

### Python

Tensorflow v2, PyTorch, Pandas, Flask, ONNX, Openpyxl, Boto3, Mongoengine, Selenium, Conda

### C++

CMake Ecosystem, Libtorch, OpenCV, ImGui for Desktop App

### C#

Windows Presentation Foundation

### Database Query & Management

PostgreSQL, MongoDB

- ❑ Studied all kinds of stripe events and designed metadatas in Stripe operations, enabled the backend to make persistence changes in database according to correct events and metadatas

- Designed test cases via JUnit5 to mimic the subscription processes
- Built repository layer using **JPA** which returns AbstractAggregateRoot; Reverse engineered existing database into @Entity classes by JOOQ (surgery needed)
- Made use of Coroutines and context Dispatchers.IO intensively for IO tasks via DeferredResult which is available from spring 3.2 onwards
- Designed AOPs to track program execution flows and to store domain events because database history is very important to the payment service

#### Domain Driven Design (DDD, Partially).

- In payment project I introduced and implemented the domain driven design using JPA in order to **(i)** equip entity objects with behaviour and **(ii)** persist **domain-events** to track user behaviour
- Since we are partially DDD, we didn't implement event sourcing (i.e., being monolithic) and aggregates were not restored from event store
- The resulting design makes the application highly extensible, e.g., **(i)** adding error handling of a specific step of a chain of API calls and **(ii)** adding fallback/retry mechanism for that chain **(iii)** adding email notification; **(iv)** adding push notification, etc
- With entity being endowed with behaviour, the code became more explicit, instead of having **sporadic** (nested) services taking (id, ...params) to make database changes.

#### System Design.

- **Queuing.** Used RabbitMQ to **(i)** Rate limit api which has a limit of 100 concurrent calls (azure openai service); **(ii)** Delay actions by staling messages into DeadLetter Queue
- **Inapp Notification.** Created a table to store notification in granular level, and designed API to enable the frontend to display notification such as **(i)** New messages in a channel; **(ii)** New channels to join; **(iii)** Number of Unread Messages in a chat room
- **Payment.** Designed table to allow users to subscribe, upgrade, downgrade and cancel plans for the extra usage limit in our app

#### AWS Cloud Solution

- Deployed node.js and spring boot application onto ECS
- Created Scheduled Task running in container via ECS to backup PostgreSQL and MongoDB database regularly at the same time
- Shared knowledge how to config load-balancer to detect special header in order for my teammates to route requests to a special backend (e.g., for apple tester in iOS app)
- Developed Lambda functions in various use cases such as **(i)** LLM Application in Python; **(ii)** file generation and **(iii)** google authentications in Node.js; and **(iv)** ordinary spring application in Kotlin
- Developed Lambda functions to execute web application in docker image, both in python and nodejs in cases the unzipped module size inevitably exceeds 250MB. e.g.,
  - ❑ Used packages (i) react, (ii) react-pdf and (iii) sharp for pdf-file generation
  - ❑ Used Langchain with CPU-inference model such as fasttext (with huge weight file)

#### DevOps / CICD via Github Actions

- Created **automated deployment** workflows for frontend and backend via github actions. **Automations** include:
  - ❑ Deployment of containerized node.js and spring boot application using AWS ECS Fargate via the following steps
    - 1. Push to image registry
    - 2. Update task definition
    - 3. Instruct ECS Service to use the updated task
  - ❑ Deployment of all frontend projects onto S3 and cache-invalidation in AWS Cloudfront
  - ❑ Deployment of Lambda functions
- Created Docker Action written in python to let teammates download cloudwatch logs from various log-group and from custom start-time (via workflow\_dispatch options), with the log file being downloadable as an artifact

#### iOS Deployment to AppStore with EXPO.

- Handled App Submissions and Rejections via TestFlight
- Created OTA Update to patch the application
- Managed everything above with 3 stages (DEV, UAT, PROD)

#### Rust

Implementation of Elliptic Curve Digital Signature Algorithm, [Code Explanation and Implementation](#)

#### Data Streaming/Monitoring

Kafka with Debezium

#### Message Broker

RabbitMQ, AWS SQS

#### Art

Photoshop CC, 3DS Max, Saola Animate (HTML5 Game), 2D Game Character Design

### Art Portfolio

<https://www.artstation.com/check-errc>

## AI Engineer

15 Aug 2022 ~ April 2023<sup>8.4 Months</sup>

Eye Catching Limited, Hong Kong

Python. PyTorch

Typescript. Tensorflow, Onnx

C++. Libtorch, ImGui, CMake Ecosystem

- Maintained angular project
- Studied eye-tracing related algorithm
- Studied and deployed machine learning algorithm in web-app and desktop-app
- Completely translated a BlazeFace model in python into the same model in libtorch of C++ for GUI application
- Implemented methods to ensure weights in pytorch model can be used in libtorch model
- Studied CMake and developed software to combine libtorch model and imgui application

## Senior Software Developer

Sep 2021 ~ July 2022<sup>10.9 Months</sup>

RaSpec Intelligence Inspection Limited, Hong Kong

Python. Selenium, Boto3, Mongoengine, gRPC, PyTorch, Tensorflow

Annotation. CVAT, COCO-Annotator

AI-General. Data Annotation, DataLoader with Various Data Augmentations, Model Training for Rust Detection, Model Training for Crack Detection

AI-Models. GAN for Producing Synthetic Data, Faster RCNN from Scratch and its Modification, Single Stage Headless **Face** Detector into **Rust** Detector

### Web Related

- Maintained React Next project
- Implemented data scrapping for house transactions records
- Automated the process of tracking latest rtk-data from official geodetic website and data-processing pipeline using selenium and pywinauto

### Object Detection Related

- **Text Detection.** Managed to run an open-sourced text detection (EAST) to facilitate signboard defect classification
- **Crack Detection.** Helped implement detection model for crack and spalling
- **Rust Detection.** Implemented two solutions: (i) Text removal, then classification pipeline; and (ii) direct object detection model using faster rcnn

### Image Generation/Inpainting

- **DefectGAN.** Implemented image-generation model following [this paper](#) that generates synthetic data on cracks and spallings for training defect detection models on facades
- **Text Removal.** Experimented with existing algorithms like various GAN or image-inpainting method in pytorch. Finally I follow [this paper](#) to obtain a text eraser with satisfactory performance

## Software Engineer

Aug 2020 ~ Mid-Aug 2021<sup>1.03 Years</sup>

EAB Systems (Hong Kong) Limited, Hong Kong

Typescript. React, Redux, React-Native, Express, Mongoose, Sendgrid, Twilio, socket.io

Python. Pandas, Tensorflow v2

### Web Application

- Built video conferencing frontend and backend application in React, Twilio and express
- Built CMS system that lets users create their own single page application

### Machine Learning Related

- Built CSV Importer (together with an express layer and a Flask layer) that can parse a csv/excel file and perform:

- ❑ **Data Classification.** Classified column based on existing data using LSTM model with two dense layers and finally a softmax ([sample code](#))
- ❑ **Auto Date-reformatting.** Based on machine learning model (transformer in NLP), translated all common form of date into YYYY-MM-DD format ([sample code](#))

## Frontend Developer

Sep 2019 ~ Aug 2020<sup>11.9 Months</sup>

eLearningPro, Hong Kong

Javascript. React

Python. tkinter, pyinstaller

Art. Adobe Premiere, Adobe Photoshop, Saola Animate (CSS Animation)

- Create HTML5 Games, maintain web pages and construct React frontend application
- Created a python GUI project for text extraction from an image (a work necessary to translate old fresh game into html5 game, [detail](#))

## 2D Game Artist

Jan 2018 - Dec 2018<sup>11 Months</sup>

深圳瘋点子科技有限公司, Sheng Zheng

- Responsible for constructing 3d accessories, creating environment art and character design. Game that I worked on [link](#)

## Senior Research Assistant

Mar 2015 - Oct 2015<sup>6.9 Months</sup>

Department of Mathematics, Hong Kong Baptist University, Hong Kong

- Study HJB equations arised in specific financial games

## Research Assistant

Sep 2014 - Feb 2015<sup>6 Months</sup>

Department of Mathematics, Hong Kong University of Science and Technology, Hong Kong

- Study the properties of viscosity solution of HJB equations

## Teaching Assistant

Sep 2012 - June 2014<sup>1.82 Years</sup>

Department of Mathematics, Hong Kong University of Science and Technology, Hong Kong

- Fulfill teaching duty as required in obtaining studentship in the course of M.Phil study. Subjects include: [1] Calculus II, [2] Linear Algebra, [3] Mathematical Analysis, [4] Real Analysis.