

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^{1.54 Years}

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, 3 (Kotlin Spring Boot, 1 serving mobile and 1 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.

- **Queueing.** 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 google authentications in Node.js; and **(iii)** ordinary spring application in Kotlin
- Developed Lambda functions to execute web application in docker image, both in python and nodejs when unzipped file 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-ercc>

AI Engineer

15 Aug 2022 ~ April 2023^{8.4 Months}

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^{10.9 Months}

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^{1.03 Years}

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^{11.9 Months}

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^{11 Months}

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^{6.9 Months}

Department of Mathematics, Hong Kong Baptist University, Hong Kong

- Study HJB equations arised in specific financial games

Research Assistant

Sep 2014 - Feb 2015^{6 Months}

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^{1.82 Years}

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.