Data Science in the AWS Cloud: Bootcamp & Accelerator

by SG Code Campus

In partnership with AWS, Dunman Secondary School & Tampines Town Council

Introduction

About SG Code Campus

Comprehensive coding school for students of all ages

- Founded and managed by Berkeley and Stanford alum

- Official training partner for Amazon Web Services (AWS), Apple and SMU Academy

About SG Code Campus

Comprehensive coding school for students of all ages

- 4 learning centres located at Bishan, Bukit Timah, Marine Parade and Tampines
- Delivered courses to over 5,000 kids, youths, MOE school students and working professionals since 2016
- Graduates have taken top placings in National and international coding competitions since 2017:
  - iMDA Code::Xtreme:Apps hackathon
  - AWS Build On, Singapore Hackathon
  - National Olympiad for Informatics (NOI)
  - International Olympiad for Informatics (IOI)
- Visit us at www.sgcodecampus.com

About The Bootcamp and Accelerator Programmes

At a glance

- We will be conducting two related programmes (**fully subsidised for all participants)** for students from MOE Secondary Schools and Junior Colleges, regardless of stream
  - Bootcamp
    - 22 hour programme for 240 participants
    - Conducted over the **first week of the 2021 June holidays (31 May - 5 June)**
    - Covering Introductory Python Programming with applications to Deep Learning in Self-driving cars
  - Accelerator
    - 88 hour programme for 40 participants
    - Conducted weekly **from 19 June to 30 November**
    - Covering Advanced Python Programming with applications to Cloud Computing and Deep Learning
- Participants may choose to take part in either or both of the programmes (subject to availability)

About AWS

Bootcamp & Accelerator Programme Partner

- **AWS (Amazon Web Services)** is a subsidiary of **Amazon.com Inc** that provides on-demand cloud computing services to millions of customers. It is the world's leading cloud platform, according to Gartner Research's 2020 Magic Quadrant for Cloud Infrastructure & Platform Services, and has the most extensive and reliable global cloud infrastructure. AWS offers an extensive range of cloud-based products from infrastructure technologies like compute, storage and databases to emerging technologies such as artificial intelligence, analytics and Internet of Things
- For the Bootcamp and Accelerator, AWS will be **sponsoring** each participant with **AWS cloud accounts** endowed with US$100 worth of Cloud Computing credits
- AWS is also sponsoring the following hardware
  - 20 **AWS DeepRacers** to **Dunman Secondary School** - programmable robotic model race cars to run the DeepRacer League competitive racing event that is the hallmark of the Bootcamp
  - A programmable **DeepLens camera** and **DeepComposer** keyboard to each Accelerator participant

About Dunman Secondary School

Bootcamp & Accelerator Programme Partner

- **Dunman Secondary School** is an autonomous co-educational secondary school in **Tampines**, Singapore, founded in 1963. As a government school, Dunman Secondary offers three academic streams, the Express course and Normal Course comprising of the Normal (Academic) and Normal (Technical) academic tracks
- Dunman hosts a **Centre of Excellence (COE)** which focuses on Innovations in Science, and prides itself to lead in continuous improvements in the teaching and learning of Science with originality and creativity. Through its diverse programmes and activities for both students and teachers, the COE hopes to increase its outreach to more schools in the East Zone of Singapore
- Dunman Secondary will be the physical site of the **AWS DeepRacer League** - where **Bootcamp** participants compete in teams against each other by using their Python coding skills over the AWS Cloud to remotely control a robotic race car speeding around a racetrack at Dunman over a live video feed

About Tampines Town Council

Bootcamp & Accelerator Programme Partner

- **Tampines Town Council** was set up in 1990 to manage and maintain common property of HDB residential flats and HDB commercial properties within Tampines Town. The five divisions the Town Council manages are: Tampines Central, Tampines East, Tampines North, Tampines West and Tampines Changkat. As part of its 5-year master plan, Tampines Town Council is transforming Tampines into a sustainable Eco-Town by 2025. These efforts will be launched progressively in a series of collaborations with its partners
- Tampines Town Council will provide **challenge statements** to the participants of the **Accelerator** programme which reflect some of the **real-world issues** that the town council encounters in managing Tampines estate. Participants will apply the skills acquired over the programme towards a **capstone data science project** that addresses one of the problems outlined in the challenges

Bootcamp

About the Bootcamp

Programme Objectives

- The Bootcamp aims to help participants take their first definitive steps towards preparing for the modern technology-oriented and data-driven workplace by providing them with a foundation in basic coding skills and cloud computing
- The programme further seeks to inspire and ignite their passion for Technology through the application of these skills in the field of Artificial Intelligence. Participants get hand-on experience through learning how to program the **AWS DeepRacer** - a self-driving robotic model race car developed by Amazon
- The programme ends with the **AWS DeepRacer League** - where participants compete against each other by remotely programming a DeepRacer to speed around a physical racetrack set up at **Dunman Secondary School**, where races are broadcast live over a video stream

About the Bootcamp

Programme Objectives

- At the end of the Bootcamp, participants should be able to
  - Write **simple programs** using variables, control flow and functions to solve simple problems in arithmetic and text processing
  - Understand **Deep Reinforcement Learning** as a sub area of Artificial Intelligence where computers are programmed to learn based on repeatedly acting on feedback collected from their environment in real-time
  - Be able to cite real-world use cases of Deep Reinforcement Learning such as self-driving cars and robot Chess/Go players

About the Bootcamp

Overview

- **Fully subsidised for all participants**
- Conducted **online** for **240 participants,** featuring a **1:20 instructor-to-student ratio**
- Enrolment of **Secondary 2 and 3** students will be **prioritised**
  - Secondary 1, Secondary 4-5 and JC students will be considered when all Sec 2-3 prospects have been placed
- Programme is **designed for** students with **no prior programming experience**
  - Students with around 20 hours (or more) of Python programming experience obtained elsewhere are advised to apply for the Accelerator programme

About the Bootcamp

Overview

- Each participant will each receive a AWS cloud account with US$100 of cloud computing credits to facilitate their learning, sponsored by AWS
- Programme will **cover introductory Python programming, Cloud Computing on the AWS Cloud**
- **Deep Reinforcement Learning** will be introduced
  - learn about the key technology powering self-driving car technologies developed at firms like Tesla and Google Waymo

About the Bootcamp

AWS DeepRacer League

- The Bootcamp culminates in an **AWS DeepRacer League race**
  - Students will **pit their Python skills in groups** against each other by **programming a DeepRacer (a 1/18th scale self-driving autonomous car)** around a racetrack
  - 20 DeepRacer self-driving cars sponsored by AWS
  - We are in good company - DBS recently ran the world's largest private corporate AWS DeepRacer League to train more than 3,000 employees on Artificial Intelligence/Machine Learning: https://www.youtube.com/watch?v=OFlzbGdKFoM

About the Bootcamp

AWS DeepRacer League

- The **AWS DeepRacer League** will be **run in hybrid format**
  - Event emcee and a pit crew from SG Code Campus will be physically present at the race grounds set up at **Dunman Secondary School**
  - Bootcamp **participants will be logged on online** to the event, which will be **live-streamed with a professional video-casting crew**
  - **Teams will work online and interact with the SGCC pit-crew onsite** to load their Python command code to the model cars via their AWS Cloud accounts, tweaking and refining their car performance in real time
- **Top graduates** will be **invited to** take part in the **follow-up Accelerator programme**

About the Bootcamp

Registration Process

- To register, please visit the **programme website** https://www.sgcodecampus.com/datascience-bootcamp-accelerator
- This programme is only open to students attending a Singapore Ministry of Education (MOE) Secondary School or Junior College
- Each application must be submitted by an official representative of the school (teacher or staff)
- Students must sign up in **groups of 5** (as students compete in teams of 5 in the DeepRacer League). Schools are welcome to send in more than 5 participants in their application using the programme website
- Students or their parents interested in the programme should contact their relevant school staff

About the Bootcamp

Programme Schedule

Bootcamp: Python Programming and Cloud Computing						
Session	**Term Week**	**Day**	**Date**	**Time**	**Hours**	**Comments**
1	June Holidays	Mon	31-May	9:00AM - 12:00PM & 1:00PM - 4:00PM	6	
2	June Holidays	Tue	1-Jun	9:00AM - 12:00PM & 1:00PM - 4:00PM	6	
3	June Holidays	Wed	2-Jun	9:00AM - 12:00PM & 1:00PM - 4:00PM	6	
Bootcamp: DeepRacer League Qualifiers						
4	June Holidays	Thu	3-Jun	9:00AM - 11:30AM	2.5	Each Participant will be allocated to, and will only attend, one of these time slots (2 hour 30min)
	June Holidays	Thu	3-Jun	12:30PM - 3:00PM		
	June Holidays	Thu	3-Jun	4:00PM - 6:30PM		
	June Holidays	Fri	4-Jun	9:00AM - 11:30AM		
	June Holidays	Fri	4-Jun	12:30PM - 3:00PM		
	June Holidays	Fri	4-Jun	4:00PM - 6:30PM		
	June Holidays	Sat	5-Jun	9:00AM - 11:30AM		
	June Holidays	Sat	5-Jun	12:30PM - 3:00PM		
Bootcamp: DeepRacer League Finals and Closing Ceremony						
5	June Holidays	Sat	5-Jun	4:00PM - 5:30PM	1.5	

Accelerator

About the Accelerator

Programme Objectives

- The Accelerator programme seeks to develop deep technology skills in students who have demonstrated a prior interest in and passion for the emergent fields of Data Science and Artificial Intelligence
- The programme covers both academic and practical concerns which are usually only accessible in a higher academic setting or at a technology workplace. Talented students gain valuable exposure and up-skilling with the ultimate goal of supercharging and accelerating their promising future careers in Technology

About the Accelerator

Programme Objectives

- At the end of the programme, Accelerator participants should be able to:
  - Understand Data Science as a set of principles, problem definitions, processes and algorithms for extracting non-obvious and useful patterns from large data sets
  - Represent complex real-world entities as data in Python programmes with data structures (lists and dictionaries), classes and objects to solve problems of increasing complexity
  - Use the CRISP-DM framework for structuring and executing Data Science projects to solve real world business problems
  - Use Python data visualisation tools to conduct preliminary data analysis to understand a given data set
  - Use Python to clean, process and prepare data for future modelling
  - Apply Machine Learning and Deep Learning, both locally and on the AWS Cloud, to model patterns in large datasets to solve real-world problems
  - Deploy the Data Science applications and projects to the AWS Cloud

About the Accelerator

Overview

- **Fully subsidised for all participants**
- The programme will cover
  - Advanced Python Programming
  - General Data Science skills including visualisations, data wrangling, machine learning
  - Artificial Intelligence and Deep Learning using the AWS Cloud
  - Design thinking and project management skills for conducting a Data Science Project
  - Presentation skills and techniques for conducting a demo of a software prototype
  - A practical learning component featuring an applied Data Science project addressing challenge statements from **Tampines Town Council** representing real-world problems encountered in the running of Tampines estate

About the Accelerator

Overview

- This programme will be conducted online but in the event that COVID-19 social distancing measures and regulations evolve to allow for in-person learning, we will work to move the conduct of the classes to face-to-face lessons conducted at either
    - The SG Code Campus Tampines Learning Centre
    - Training Rooms at AWS Corporate Offices in Singapore
- The Accelerator programme is designed to be
    - a follow-on programme for graduates of the Bootcamp
    - a jump-on point for students with prior experience in Python programming gained from sources other than the Bootcamp
- Graduates of the Bootcamp will be prioritised for the Accelerator, but interested applicants with prior programming experience can also apply to the Accelerator programme directly on the programme website starting **15 May 2021**

About the Accelerator

Overview

- Conducted over **88 hours** for **40 participants**
  - Featuring a **1:13 instructor-student ratio** and a **1:5 teaching assistant-student ratio**
  - Composed of
    - **Weekly classes** on **Saturday** afternoon between **June-November**
    - **Weekday sessions** during the **November-December School holidays**
    - **Schedule** available on the programme website
    - Please ensure that you can attend at least **75% of the sessions** if you sign up
  - Graduation Ceremony and App Showcase for the graduates of the Accelerator will take place on **Saturday, 21 Jan 2022**

About the Accelerator

Overview

- **AWS will sponsor** each Accelerator participant with
  - **US$100** of Cloud Computing credits via an AWS cloud account
  - An **AWS DeepLens** - a smart camera worth US$249 to facilitate their education in the use of Deep Learning for machine vision and smart applications built for Tampines Town Council
  - An **AWS DeepComposer** - a smart musical keyboard worth US$99 to facilitate their education in the use of Deep Learning/AI to create original music

About the Accelerator

Programme Schedule (subject to change)

Session	Term Week	Day	Date	Time	Hours
1	June Holidays	Sat	19-Jun	1:00PM - 4:30PM	3.5
2	June Holidays	Sat	26-Jun	1:00PM - 4:30PM	3.5
3	Term 3 Week 1	Sat	3-Jul	1:00PM - 4:30PM	3.5
4	Term 3 Week 2	Sat	10-Jul	1:00PM - 4:30PM	3.5
5	Term 3 Week 3	Sat	17-Jul	1:00PM - 4:30PM	3.5
6	Term 3 Week 4	Sat	24-Jul	1:00PM - 4:30PM	3.5
7	Term 3 Week 5	Sat	31-Jul	1:00PM - 4:30PM	3.5
8	Term 3 Week 6	Sat	7-Aug	1:00PM - 4:30PM	3.5
9	Term 3 Week 7	Sat	14-Aug	1:00PM - 4:30PM	3.5
10	Term 3 Week 8	Sat	21-Aug	1:00PM - 4:30PM	3.5
11	Term 3 Week 9	Sat	28-Aug	1:00PM - 4:30PM	3.5
12	Term 3 Week 10	Sat	4-Sep	1:00PM - 4:30PM	3.5
BREAK					
13	Term 4 Week 6	Sat	30-Oct	1:00PM - 4:30PM	3.5
14	Term 4 Week 7	Sat	6-Nov	1:00PM - 4:30PM	3.5
15	Term 4 Week 8	Sat	13-Nov	1:00PM - 4:30PM	3.5
16	Nov-Dec Holidays	Mon	15-Nov	10AM - 12:30PM & 1:30PM - 4:00PM	5
17	Nov-Dec Holidays	Tue	16-Nov	10AM - 12:30PM & 1:30PM - 4:00PM	5
18	Nov-Dec Holidays	Wed	17-Nov	10AM - 12:30PM & 1:30PM - 4:00PM	5
19	Nov-Dec Holidays	Sat	20-Nov	1:00PM - 4:30PM	3.5
20	Nov-Dec Holidays	Mon	22-Nov	10AM - 12:30PM & 1:30PM - 4:00PM	5
21	Nov-Dec Holidays	Wed	24-Nov	10AM - 12:30PM & 1:30PM - 4:00PM	5
22	Nov-Dec Holidays	Sat	27-Nov	1:00PM - 4:30PM	3.5
23	Nov-Dec Holidays	Mon	29-Nov	1:00PM - 4:30PM	3.5

About the Accelerator

Registration Process

- To register, please visit the **programme website** https://www.sgcodecampus.com/datascience-bootcamp-accelerator
- This programme is only open to students attending an Singapore Ministry of Education (MOE) Secondary School or Junior College. Applications for the Accelerator will open on the programme website from **15 May 2021**
- **Bootcamp graduates** only have to indicate their interest in attending the Accelerator at the end of the Bootcamp and **do not have to submit a separate application.** Bootcamp participants will be admitted to the Accelerator based on their performance on a coding assessment taken during the Bootcamp
- **Applicants who have not attended the Bootcamp** do not need their teacher's permission to attend the Accelerator but, as we would like to keep their schools updated on their progress, schools will be emailed once at the start and at the end of the Accelerator. In the online registration form, there will be a section for applicants to fill in the contact details of their CCA or form teacher (please get permission from them to fill in the form with their contact). Applicants who apply through this route will have to take an **online Python programming test** to ascertain that they have the level of coding background needed to succeed in the Accelerator (recommended 12-20 hours of programming education in Python or languages like Swift, Java, JavaScript, C++)

Q&A

Any Questions

- Please contact us at datascience@sgcodecampus.com if you have any questions

- Visit the programme website for information on both the Bootcamp and Accelerator: https://www.sgcodecampus.com/datascience-bootcamp-accelerator