KAZAKH-BRITISH TECHNICAL UNIVERSITY

SYLLABUS

Academic Year 2024-2025
Semester 1

Discipline: *Cloud Application Development*

Volume of credits: 5

Course/Syllabus designer: *Azamat Serek, Assistant-Professor*

Instructor's e-mail	a.serek@kbtu.kz
Class Schedule	Tuesday (11:00-14:00), Friday (14:00-15:00)
Office Hours	Saturday 09:00-18:00
Office	

1. Course Overview

The Cloud Application Development course offers an immersive experience in building, deploying, and managing scalable applications on Google Cloud Platform (GCP). Throughout the course, students will gain hands-on expertise in utilizing the Google Cloud SDK and Cloud Shell for efficient cloud development. They will explore the capabilities of Google App Engine and learn how to build robust applications with Google Cloud Functions, alongside containerizing applications for flexible deployment. The course delves into managing APIs with Google Cloud Endpoints and working with various Google Cloud databases, ensuring data is effectively stored and accessed. As the course progresses, students will integrate machine learning models into their applications, develop event-driven architectures, and implement best practices in application security. Advanced topics such as scaling applications on Google Cloud, monitoring and debugging cloud environments, and optimizing costs for cloud-based solutions are also covered. By the end of the course, students will be equipped with the skills needed to develop, secure, and manage cloud applications efficiently.

Prerequisites: _____

Postrequisites: _____

2. Aims and objectives

Aims:

1. To provide students with a comprehensive understanding of cloud-based application development using Google Cloud Platform (GCP).
2. To equip students with the skills to design, develop, deploy, and manage scalable and secure cloud applications.
3. To introduce students to best practices in cloud application development, including cost optimization, security, and integration of machine learning.
4. To enable students to build event-driven architectures and manage APIs effectively in a cloud environment.

Objectives:

1. Understand Google Cloud Platform: Describe the core components and services offered by GCP, including Google Cloud SDK, Cloud Shell, and Google App Engine.
2. Develop Cloud Applications: Build, deploy, and manage applications on Google Cloud using Cloud Functions, containerization, and API management.
3. Utilize Google Cloud Databases: Implement and manage cloud databases for applications on Google Cloud.
4. Integrate Machine Learning: Incorporate machine learning models into cloud applications using GCP services.
5. Develop Event-Driven Architectures: Design and implement event-driven architectures that respond to real-time data.
6. Ensure Application Security: Apply best practices for securing cloud applications, including managing authentication, authorization, and data protection.
7. Scale Applications: Implement strategies to scale applications efficiently on Google Cloud to handle varying workloads.
8. Monitor and Debug Applications: Utilize GCP tools for monitoring, logging, and debugging cloud applications to ensure reliability and performance.
9. Optimize Costs: Apply techniques for optimizing the cost of running applications on Google Cloud.

3. Learning outcomes

By the end of the Cloud Application Development course, students will be able to:

1. Explain Google Cloud Platform Architecture: Demonstrate an understanding of the key components, services, and architecture of the Google Cloud Platform (GCP).

2. Develop Cloud-Based Applications: Build and deploy cloud applications using Google Cloud services such as Google App Engine, Google Cloud Functions, and containerization tools.

3. Manage and Optimize APIs: Implement and manage APIs using Google Cloud Endpoints, ensuring efficient and secure communication between different components of cloud applications.

4. Implement Cloud Databases: Integrate and manage Google Cloud databases, optimizing data storage and retrieval for cloud applications.

5. Integrate Machine Learning into Applications: Design and implement machine learning models into cloud-based applications, leveraging GCP’s machine learning services.

6. Create Event-Driven Architectures: Develop and deploy event-driven architectures that respond dynamically to real-time events within cloud applications.

7. Apply Security Best Practices: Ensure the security of cloud applications by implementing best practices for authentication, authorization, data protection, and network security.

4.Textbooks and readings

Primary textbook

1. "Google Cloud Platform for Developers: Build and Deploy Scalable Cloud Applications using Google Cloud Platform Services" by Ted Hunter and Steven Porter.
   Publisher: Packt Publishing
   Edition: 1st Edition (2021)
   ISBN: 978-1800204693
2. Building secure and reliable systems:best practices for designing, implementing, and maintaining systems / Adkins Heather [et al.]. - USA : O'REILLY, 2020. - p.519 : ill. - ISBN 978-1492-08312-2 : 28000-00. Authors: Adkins Heather, Beyer Betsy, Blankinship Piotr, Oprea Ana, Stubblefield Adam

Supplementary textbooks

"Designing Data-Intensive Applications: The Big Ideas Behind Reliable, Scalable, and Maintainable Systems" by Martin Kleppmann.

Publisher: O'Reilly Media
Edition: 1st Edition (2017)
ISBN: 978-144937332

5. Lesson Program

Week	Classes				
	Topic	Lecture	Laboratory	Tutorial	Textbook Chapter
1	Introduction to Google Cloud Platform	2	1		1
2	Google Cloud SDK and Cloud Shell	2	1		2
3	Google App Engine	2	1		3
4	Building with Google Cloud Functions	2	1		4
5	Containerizing Applications	2	1		5
6	Managing APIs with Google Cloud Endpoints	2	1		6
7	Midterm	2	1		7
8	Google Cloud Databases	2	1		-

9	Integrating machine learning	2	1		8
10	Developing event-driven architectures	2	1		9
11	Application security best practices	2	1		10
12	Scaling applications on Google Cloud	2	1		11
13	Monitoring and debugging cloud applications	2	1		12
14	Cost optimization for Cloud applications	2	1		13
15	Review	2	1		14

6. Course Requirements and Grades

COURSE ASSESSMENT PARAMETERS

Assignments	30%
Midterm	30%
Final exam	40 %
Total	**100 %**

№	Assessment criteria	Weeks																Total
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16 17	
1.	Attendance has to be more than 80%																	
2.	Activity on seminars and homework			+			+				+			+				20%
4.	Quizes and mid/end-terms							+										40%
5.	Final examination																+	40%
	Total	60															40	100%

Grading policy:

1. 4 Assignments (30)
2. Midterm (30)
3. Final (40)

Grade	Achievement percentage	Assessment criterion

«Excellent»	A	95-100%	This grade is given when the student: demonstrated a complete understanding of the course material; did not make any errors or inaccuracies; completed control and laboratory work in a timely and correct manner, and submitted reports on them; demonstrated original thinking; submitted control quizzes on time and without any errors; completed homework assignments; engaged in research work; independently used additional scientific literature in studying the discipline; was able to independently systematize the course material.
	A -	90-94%	
«Good»	B+	85-89%	This grade is given when the student: Has mastered the course material at no less than 75%; Did not make gross errors in responses; Timely completed control and laboratory work and submitted them without fundamental remarks; Correctly completed and timely submitted control tests and homework assignments without fundamental remarks; Utilized additional literature as indicated by the instructor; Engaged in research work, made non-fundamental errors, and fundamental errors corrected by the student themselves; Managed to systematize the course material with the help of the instructor.
	B	80-84%	
	B-	75-79%	
	C+	70-74%	
«Satisfactory»	C	65-69%	This grade is given when the student: Has mastered the course material no less than 50%; Required assistance from the instructor when completing control and laboratory work, homework assignments; Made inaccuracies and non-fundamental errors when submitting control tests; Did not demonstrate activity in research work, relied solely on the educational literature indicated by the instructor; Experienced more difficulty in systematizing the material.
	C-	60-64%	
	D+	55-59%	
	D	50-54%	

7. General Rules

Academic Integrity

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Attendance policy

ATTENTION!

1) If student missed more than **30% of lessons student receives «F (Fail)»** grade;
2) If for two attestations student receives 29 or less points, this student is not accepted to final exam and for all course he (she) receives **«F (Fail)» grade;**
3) If student receives on final exam 19 or less points, then independently on how many points he (she) received for two attestations, in whole he (she) receives **«F (Fail)» grade;**

In the case of missing or being late for final exam without plausible reason, independently on how many points he (she) received for two attestations, in whole he (she) receives **«F (Fail)» grade.**

4) If a student missed more than 30% of the lectures due to health problems and has medical documents in the form of KBTU, but did not complete the course and it is recommended to take an academic leave.
5) In case of detection **of plagiarism** in the course, the student is automatically receives **«F (Fail)» grade**.

Academic Policy:

- Cheating, duplication, falsification of data, plagiarism are not permitted under any circumstances!
- Students must participate fully in every class. While attendance is crucial, merely being in class does not constitute "participation". Participation means reading the assigned materials, coming to class prepared to ask questions and engage in discussion.
- Students are expected to take an active role in learning (the instructor will provide the information and guidelines to do this).
- Students must come to class on time.
- Students are to take responsibility for making up any work missed.
- Make up tests in case of absence will not normally be allowed.
- Mobile phones must always be switched off in class.
- Students should always show tolerance, consideration and mutual support towards other students.

Students are encouraged to

- consult the teacher on any issues related to the course;
- make up within a week's time for the works undone for a valid reason without any grade deductions;
- make any proposals on improvement of the academic process;
- track down their continuous rating throughout the semester.

Minutes #1 of School of Information Technology and Engineering meeting on August 20, 2024