Introduction and Application of Real Time Databases

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Abstract—**This document outlines our research proposal on real-time database systems.**

I. PROBLEM STATEMENT

Real-time database system is a database system where timing constraints are associated with transactions and data have specific time intervals for which data is valid. The groups goal will be to introduce the concepts and constraints associated with the implementation of real-time databases in real-world applications

II. RESEARCH METHODOLOGY

A survey-paper approach to real-time database applications will be utilized in an effort to gain in-depth understanding of real-time database implementation and applications. We will discuss in detail the use and implementation of real-time databases in various applications.

Firebase, Google's NoSQL cloud database, will be discussed as a concrete example of an open-source, real-time, cloud-hosted database.

III. PREVIOUS WORK RELATED TO THE PROBLEM

There are numerous academic papers that we identified related to the implementation and employment of real-time databases for various applications. The reference section of this paper lists the papers we have identified through our preliminary literature review ([1], [2], [3], [4], [7]) . In addition to academic papers, whole textbooks have been written which provide background on real-time database concepts, architecture, and implementation ([5], [6]).

Through the team's preliminary research we have also identified numerous on-line sources of information related to real-time databases. Most notably, Google hosts a cache of documentation for their Firebase Realtime Database at `https://firebase.google.com/docs/database/` which the team intends to use to discuss how real-time databases are used with a concrete example showing how Firebase is utilized in an actual application.

IV. RESEARCH PLAN AND SCHEDULE

A. Team Meetings

Wednesdays at 8:30 P.M. EST and Saturdays at 8 A.M. EST via Zoom. Scheduled and invites coordinated by Karl.

B. Communication Tools

a) Slack:

Channel: 7330TermProject
`7330termproject.slack.com`

b) Github:

Repository: MSDS_7730_Project_TD_RG_KJ
`https://github.com/ kjurekSMU/MSDS_7730_Project_TD_RG_KJ`

C. Project Milestones

Week 4 **June 2, 2019**	Submit Project Proposal **2DS Submission**
Weeks 5-6	Establish a Github Repository Continue survey-paper research into RTDBs.
Week 7 **June 25, 2019**	Prepare Initial Presentation **Class Presentation**
Week 8-9	Research into Google Firebase as a concrete example of RTDBs. Explore possible implementation of Firebase.
Week 10 **July 14, 2019**	Project Draft I **2DS Submission**
Week 11-12	Finalize research. Prepare research for final presentation and final paper.
Week 13-14 **August 6, 2019** August 13, 2019	Final presentation ready. textbfClass Presentation
Week 15 **August 18, 2019**	Final Paper ready to submit **2DS Submission**

V. RESOURCES NEEDED

The team will utilize the SMU library's digital collection of academic articles to perform our survey research. In addition to our survey research, we will be utilizing Google's documentation for Firebase to develop a concrete example of how real-time databases are implemented and employed. The team does not foresee any resource limitations that would need to be addressed before proceeding with this research topic.

VI. Important pieces we don't yet have access to

As discussed, the team does not foresee any obstacles to obtaining the information or resources we will need to complete this research project.

References

[1] Han, Song et al. "Adaptive Co-Scheduling for Periodic Application and Update Transactions in Real-Time Database Systems." The Journal of Systems & Software 85.8 (2012): 1729–1743.

[2] Sun, Q et al. "Implementation of Massive Real-Time Database System Using Network Sensors and Sector Operation." Sensors & Transducers 174.7 (2014): 123–128.

[3] Jian-Feng, Lu, Chun-Yi, Wang, and Jie, Hu. "A High Performance Data Storage Method for Embedded Linux Real-Time Database in Power Systems." Energy Procedia 16.PB (2012): 883–888.

[4] S. Samaiya and M. Agarwal, "Real time database management system," 2018 2nd International Conference on Inventive Systems and Control (ICISC), Coimbatore, 2018, pp. 903-908.

[5] Lam, Kam-Yiu., and Kuo, Tei-Wei. Real-Time Database Systems Architecture and Techniques / Edited by Kam-Yiu Lam, Tei-Wei Kuo. Boston, MA: Springer US, 2002.

[6] RTDB: A Memory Resident Real-Time Object Database. United States. Dept. of Energy. Office of Energy Research, 2003

[7] Huang, K., Zhang, J., & Yao, J. (2012). Exploration on the application of real-time database in ship electronic information system. Applied Mechanics and Materials, 263-266, 1414.