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EDUCATION

KOÇ UNIVERSITY, COLLEGE OF ENGINEERING, İSTANBUL

2012 – 2017

Graduate, Computer Engineering, Cumulative GPA 3.30/4.00

ROTARY 100. YIL ANADOLU LİSESİ (HIGH SCHOOL), İSTANBUL

2008 – 2012

PROFESSIONAL EXPERIENCES

TÜRKİYE İŞ BANKASI

JULY-AUG 2014 - SUMMER INTERN, İSTANBUL, TURKEY

- ❖ I had worked on network infrastructure of the bank at its HQ
- ❖ I had been trained about local and wide area communication

SIEMENS

JULY-AUG 2015 - SUMMER INTERN, İSTANBUL, TURKEY

- ❖ I had worked on software projects in Siemens' Development Center within Corporate Technology Division.
- ❖ I supported on R&D Projects and implemented a plugin for JIRA issue tracking software on Java.

ACHIEVEMENTS

ACM WOMENCOURAGE EVENT

SEPTEMBER 2017, UPCOMING

Our project, *Loopcake*, is accepted to poster event of ACM womENCourage 2017 in Barcelona. We are going to present the details of the project in September 2017 at Universitat Politècnica de Catalunya. You can find more details about our project, and the accepted abstract paper at the end of this document.

KWORKS PRE-ACCELERATION PROGRAMME

SEPTEMBER 2017, UPCOMING

Our project *Loopcake* is accepted to the pre-acceleration program of KWORKS - Koç University Entrepreneurship Research Center. It is planned that our startup pre-acceleration program will start in September 2017, and will take 6 to 7 months.

BEST SENIOR DESIGN PROJECT

JUNE 2017, 1ST PLACE

Our senior design project, *Loopcake*, is selected as the best senior design project of the academic year 2016-2017, Computer Engineering Department at Koç University.

BI FIKIR BI SIRKET

APRIL 2017, 2ND PLACE

It was an entrepreneurship competition. Loopcake won the second place among more than 100 projects in Turkey

VEHBI KOC SCHOLAR

FALL 2016

The award was given to the successful students of the academic year.

ACADEMIC ACTIVITIES AND PROJECTS

COMPUTER AND NETWORK SECURITY

SPRING 2017

The course aimed to teach about basics of computer and network security principles that you can apply at home on your own, or as a system administrator at a company. It also increased awareness on security concepts, and thus to provoke interest in further effort in the area, through graduate studies or by joining companies or government organizations who need security experts.

COURSEWORK

We tested our knowledge on a wide variety of subject with several assignments, projects, and papers. We studied on basic security concepts such as encrypted communication, buffer overflow attacks, SQL injections, and DNS attacks. Furthermore, we enhanced our knowledge by writing and sharing papers throughout semester. A couple of my short papers can be found at my personal web page.

<http://mebegu.weebly.com/blog/computer-virus-hoaxes>

<http://mebegu.weebly.com/blog/drm-copyright-and-fair-use-regulations>

MOBILE PROGRAMMING

SPRING 2017

This course introduced building an interactive application for Android. Topics included: activity lifecycle of an application, list views, adapters, fragments, nested fragments, usage of popular Android open source libraries, common design patterns for Android, usage of Firebase backend as a service platform, action bars, navigation drawers, SQLITE, cursor, async tasks, Android built-in services and material design.

QUIZ RUSH

Quiz rush was a project that had several iterations over the semester. We used OOP design patterns to make the project flexible for upcoming versions. Also, firebase, and backend as a service concept are introduced us. Firebase cloud functions was a newly released beta at the time, and we used it as frontiers by implementing FCM for our projects with NodeJS.

<https://github.com/iozbeyli/QuizRush>

https://github.com/mebegu/Rush_Notification

<https://play.google.com/store/apps/details?id=com.fromthemind.quizrush&hl=tr>

LOOPCAKE MOBILE

This was our term project for the mobile programming course. We created a mobile application for our senior project. The development phase is very similar to the Quiz Rush project.

<https://github.com/iozbeyli/LoopcakeMobile>

COMPUTER ENGINEERING DESIGN PROJECT

FALL 2016

A capstone design course where students apply engineering and science knowledge in a computer engineering design project. Development, design, implementation, and management of a project in teams under realistic constraints and conditions. Emphasis on communication, teamwork and presentation skills.

LOOPCAKE

Loopcake is a learning management system for programming related courses. After intense work throughout the semester, we have managed to deliver a satisfactory platform that users can manage their courses and repositories. Related project documentation and repositories are given on following links. Also, the concept poster of the project is added at the end of this document.

<https://docs.google.com/document/d/1QCtH7RXb6slg58KBR4GmHSO0JV3X2QVxArNUCHCZnKQ/edit?usp=sharing>

PARALLEL PROGRAMMING

FALL 2016

Fundamental concepts of parallelism. Overview of parallel architectures, multicores, heterogeneous systems, shared memory and distributed memory systems.

OPENMP, TBB, CUDA, MPI

I had a chance to study following libraries by developing small projects. The projects were mostly about image processing with stencil patterns. Related links are presented in following.

<https://github.com/mebegu/429A1>

<https://github.com/mebegu/429A2>

<https://github.com/mebegu/429A3>

https://docs.google.com/document/d/1BhrIGb6F6RslhIGZZ7Y1Q7goMUe1TSvWvbQtUc_hx3Y/edit?usp=sharing

GPU TO GPU COMMUNICATION BENCHMARKS WITH MVAPICH2

In this project, we installed and tested GPU-Aware MPI library MVAPICH in our university HPC system. Although we faced many challenges on the way, we accomplished to install MVAPICH library in Ahtapot machine and showed its CUDA-aware communication routines provide speedup compared to non-CUDA-aware ones.

https://docs.google.com/document/d/1i9HIU88_I5R66XleJUG5RAudVqpbybe1fd5WvjGVVw/edit?usp=sharing

OPERATING SYSTEMS

SPRING 2016

Introduction to operating systems concepts, process management, memory management, virtual memory, input-output and device management, file management and file systems, job scheduling, deadlocks, interrupt structures, case studies of operating systems.

KUSH

We created a custom shell on Unix. Our final report and source code can be found on the following link;
<https://docs.google.com/document/d/1sTKAXzwF1fmilekSQ-oGyhPZIXc3DjEquAO-FIZ0sQE/edit?usp=sharing>
<https://github.com/cangumeli/Kush>

PTHREADS

With my group, we created a small Air Traffic Control simulation by using Pthreads. The source code can be found following.

<https://github.com/cangumeli/plains>

DATABASE MANAGEMENT SYSTEMS

SPRING 2016

The introductory course that covers principles of database systems. The course will emphasize both application level and system level.

FOOD PORTAL

This was a food ordering platform that is created by me and my group. We referenced the Turkish website yemeksepeti.com. The project earned one of the highest grades in the class. In a project this project, we used MySQL and PHP and built the platform from scratch without using any library or template themes. This was our first experience with these concepts. One of the reports of the project, and an early ER diagram of it can be found at the following link:

[https://docs.google.com/document/d/169eKN0q0R9If5 -
fIWZGQbDydlCshFLOmPlvOYXgACc/edit?usp=sharing](https://docs.google.com/document/d/169eKN0q0R9If5-fIWZGQbDydlCshFLOmPlvOYXgACc/edit?usp=sharing)

COMPUTER NETWORKS

FALL 2015

Principles of data communications between computers and computer networks; ISO-OSI layered model as a framework; basics of the Internet applications; data link layer; local area networks; TCP/IP protocol suite; network congestion and its control; aspects of reliable and efficient data transmission; routing; protocol design and analysis; networking applications; assessment of network performance; socket programming exercises; distributed applications.

ISYNC

iSync was a cloud service where users can store their files on a server and synchronize with it from any computer. It was developed in a short time period, and the application is just a prototype of the concept. Java WebSockets were used in the development of iSync.

<https://github.com/mebegu/iSync>

SOFTWARE RELIABILITY, SPECIFICATION, TESTING, AND VERIFICATION

SPRING 2015

Tools and techniques for ensuring software reliability. Specification formalisms and languages. Modeling tools and languages. Unit and integration testing. Automated testing and verification tools and algorithms. Mathematical representations for programs and executions. Hoare logic. Specification using modular contracts: Preconditions, postconditions, loop and object invariants. Ownership systems. Automated test generation. Model-based testing. Coverage metrics for testing adequacy. Type and effect systems for reliable software. Software model checkers. Static analysis. Concurrent/multi-threaded programs. Correctness criteria for concurrent programs: race-freedom, atomicity, linearizability, and serializability. Testing, verification and debugging tools for concurrent programs.

MS CODE CONTRACTS, PEX, DAFNY, CPACHECKER, JPF/CHESS

I used various tools to examine the prototype codes that I implemented in several programming languages. One example is published in the following GitHub repository.

<https://github.com/mebegu/Sandbox/tree/master/Course2/NatSet>

SOFTWARE ENGINEERING

FALL 2014

The introductory course that covers principles of software engineering. The course emphasizes cooperating with others on a software project. The projects were developed by groups of 4 people.

TETRİS, CHEWY LOKUM LEGEND

We developed two games on Java for this course. First one was a Tetris game, and the second was a clone of candy crush saga. Both project's repositories can be found on following GitHub links. The repositories include source codes and documentations of projects.

<https://github.com/awesome-comp302/Tetris-The-Game>

<https://github.com/awesome-comp302/chewy-lokum-legend-v2>

NON-ACADEMIC ACTIVITIES

ASSOCIATION FOR COMPUTING MACHINERY STUDENT CLUB(KU-ACM)

SEPTEMBER 2015 - 2017 - BOARD MEMBER

- ❖ KUACM organizes student activities and creates a network between all majors to accomplish different ideas.
- ❖ Last year we joined Google HashCode competition, and then, we organized our own coding event by inspiration of it.

KOÇ UNIVERSITY GAME DEVELOPERS ACM STUDENT CHAPTER (KU-GAMEDEV)

SEPTEMBER 2015 – JAN 2017 - CO-FOUNDER, PROJECT LEADER

- ❖ Ku-GameDev was a KU-ACM student chapter that aimed to support people who are interested in the Gaming industry. We organized workshops on Game Development. E.g. programming, unity, drawing, 3D modeling.
- ❖ The chapter had a team consisting of 13 people, and the team worked on 4 different projects throughout its active period.

ATTENDED PROGRAMMING COMPETITIONS

- ❖ Google HashCode 2016 – February 2016
- ❖ KU++ 2016 – Collegiate Programming Contest – May 2016
- ❖ Google HashCode 2017, *1st in KU, 373 in world* – February 2017
- ❖ İTÜ Yazılım Maratonu 17', İstanbul Technical University Programming Contest – February 2017
- ❖ KU++ 2017 – Collegiate Programming Contest – April 2017
- ❖ NASA Space Apps Challenge 2017 – April 2017

SKILLS

PROGRAMMING LANGUAGES

C, Javascript, Java, C#, C++, Bash, Lisp, VHDL, PHP, HTML, CSS

TOOLS/ LIBRARIES / FRAMEWORKS

NodeJS, Android, MVAPICH, MPI, CUDA, OpenMP, NodeGit, Git-SCM, Intel TBB, ReactJS, Pthreads, Wireshark PEX, MS Code Contracts, Dafny, Java PathFinder, CPAchecker

OTHER SOFTWARES

AtomIO, Git, MongoDB, REST API, Android Studio, Visual Paradigm, Eclipse IDE, Microsoft Visual Studio, JIRA, MySQL, Xilinx, MS Office, Adobe Photoshop CS5, Unity Engine, Trello, Slack, Blender, Thunderbird, Asana, Slack

LANGUAGES

Native Turkish

Fluent English *IELTS 6.5*

Basic French, and German

OTHER INTERESTS

I like to follow news about scientific milestones and space missions. Also, Art and architecture are one of my many interests. I play football as a goalkeeper. Fenerbahçe is my favorite team, and I attend the games as much as I can. I showed interest in game development for a period. However, currently, it has low priority for me. I love to play video games and follow gaming industry news.

In my spare times, I listen to music, and spend time on Youtube – just as viewer :). If you give me a topic that catches my attention, I could spend days to explore and learn about it. Also, I love to travel and experience other cultures.

Loopcake: Learning Management System with Version Control

Mehmet Berk Gürçay, İsmet Melih Özbeyli

Department of Computer Engineering, Koç University

İstanbul, Turkey

1 Introduction and Motivation

Software engineering education is essential for the current era. However, throughout software development and programming education, students and instructors face many problems, some of which are caused by the technical reasons, whereas some are due to the collaboration problems. We aim to address these challenges with our project.

Course Management for large classes is difficult [1,7]. On professional stage, industry uses version control systems to handle the programming challenges [1,5,7]. Some research claims that using VCS can also be beneficial for computer science education [1,2,7]. However, current VCS solutions focus on a more general stage with production and industry optionality. That causes them to become hard to learn and use for beginners and small-scale projects. We believe that integrating VCS to education with an easy to use wrapper can address the educational challenges better.

Most of the time students learn general concept of version control systems with introductory level information [4]. Hence, they do not tend to use advanced features of VCS [5,7]. Even, recruiters from industry state that most of the interns they worked with have limited or no knowledge about the version controlling [6,7].

Gaining sufficient knowledge over these systems is very crucial and beneficial for students. For instance, it enhances the collaborative effectiveness of student project groups in programming education [1,4,6,7]. When this approach is considered from an instructor perspective, using VCS can ease handling of course projects [7], and gives the opportunity to track students' progress on projects continuously. This can be essential to identify individual student efforts and give feedbacks on student projects [4,5,6,7]. Furthermore, there exist many other side benefits for using a VCS in education. For instance, instructors and researchers can observe development cycle of students, and gain insight into students' code development styles [5,6].

2 Loopcake: System Description

We designed and developed Loopcake, a learning management system with version control integration to enhance current programming education quality for universities. Additionally, beginners of VCSs tend to acquire bad user habits with current solutions and Loopcake is developed to prevent these habits to originate. For example, studies show that students do not use committing and branching functionalities efficiently and try to learn with blind testing [2,4,5,7]. Loopcake encourages the correct use of version control by rewarding users with gamification such as giving badges, rating and daily bonuses to encourage frequent use. To prevent blind testing, Loopcake gradually increases the use of advanced features and provides visual hints along the way. Therefore, students would be able to confidently use other aspects of Git rather than pull, push and commit when they graduate. It also has features that are

implemented with respect to the current understanding of what is beneficial for the education. For example, studies claim that specifying milestones for projects improves incremental progressing [5], rather than rushing the project as the

deadline gets closer. We plan to provide a task management tool and milestone mechanics along with the system. By this way, Loopcake would encourage the equal workload distribution in student groups and simplify tracking student progress for instructors.

We take advantage of open source Git VC library. Git provides disconnected operations, experimental branching, and easier collaboration. Furthermore, it is more reliable than the centralized systems because students cannot make the repository unusable by mistake [3,4,6].

3 Results

Loopcake is an ongoing project started in Fall 2016, as a senior design project in Computer Engineering. Then, its development continued with the enthusiasm of the crowd, and our vision. We have completed the prototyping phase. The current stage of the project is to build a sufficient product to serve pilot experiments on some universities. Meanwhile, we are attending software design contests, and presentations to get feedback and gain recognition. Our project has won the second-place prize on a national entrepreneurship contest and is invited to the pre-accelerator program in KWORKS incubation center. It is also selected as the best senior design project of the academic year 2016-2017, Computer Engineering Department at Koç University.

4 Acknowledgements

We would like to thank Assoc. Prof. Öznur Özkasap for her advice and encouragement.

References

- [1] C. Clifton, L. C. Kaczmarczyk, and M. Mrozek. Subverting the fundamentals sequence: using version control to enhance course management. In ACM SIGCSE Bulletin, volume 39, pages 86–90. ACM, 2007
- [2] V. Isomöttönen and M. Cochez. Challenges and Confusions in Learning Version Control with Git. In Information and Communication Technologies in Education, Research, and Industrial Applications, pages 178–193. Springer, 2014.
- [3] Clatworthy, "Distributed version control—why and how", Proc. Open Source Development Conf.(OSDC), 2007.
- [4] M. Cochez, V. Isomöttönen, V. Tirronen and J. Itkonen, "The use of distributed version control systems in advanced programming courses", ICTERI, pp. 221–235, 2013.
- [5] L. Glassy, "Using Version Control to Observe Student Software Development Processes", Journal of Computing Sciences in Colleges, vol. 21, no. 3, pp. 99–106, 2006.
- [6] Lawrance, S. Jung and C. Wiseman, "Git on the cloud in the classroom", Proceeding of the 44th ACM technical symposium on Computer science education, pp. 639–644, 2013.
- [7] K. Reid and G. Wilson, "Learning by doing: introducing version control as a way to manage student assignments", ACM SIGCSE Bulletin, vol. 37, no. 1, pp. 272–276, 2005.



LOOPCAKE

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Mehmet Berk Gürçay

Advisor: Assoc. Prof. Özgür Özkanap

Computer Engineering
Koc University



WHAT?

Learning Management System
+
Git Repository Hosting Service
=



WHY?

Version Control is Awesome

- Traceability
- Identifiability
- Clarity
- Reduced Duplication
- Reduced Errors



Loopcake is even better

- Specialized for education
- Easy to learn
- Easy to use
- Combines power of traditional elements of LMS with Git

Instructors will love Loopcake

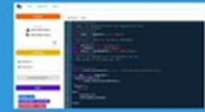
- Monitoring class activity
- Using Git and LMS together
- Fluid assignment creation and tracking
- Minimum time consumption



HOW?

Loopcake is powered by React, Nodejs, Express, MongoDB and Git.

- React: Javascript framework to design websites in object oriented fashion



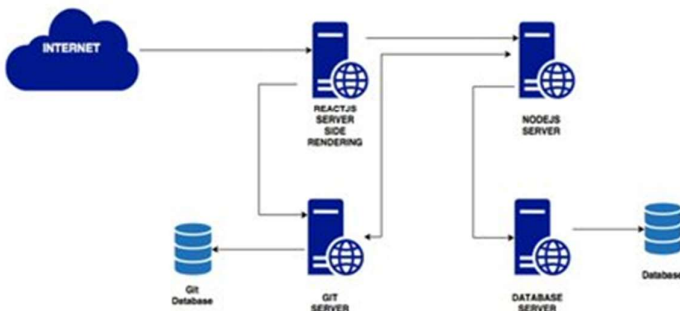
- NodeJS: Javascript runtime environment for backend development
 - NodeGit: API that allows writing custom Git applications
 - Git: Version control system



- MongoDB: Database program for our needs
- DigitalOcean: Server provider



SYSTEM NETWORK



FUTURE

We aim to enhance collaboration among all students and researchers by adding social features like Q&A system and blogging.

- ? Threads
- Articles
- Follower System
- Plagiarism Checker
- Desktop Client
- Collaborator System
- Slideshow Creator
- Notification
- Interactive Interface

REFERENCES

1. Alexey Zagalsky, Joseph Feliciano, Margaret-Anne Storey, Yiyun Zhao, Weiliang Wang, The Emergence of GitHub as a Collaborative Platform for Education, Proceedings of the 18th ACM Conference on Computer Supported Cooperative Work & Social Computing, March 14-18, 2015, Vancouver, BC, Canada
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3. E. "What's hard about using GitHub in classrooms? Issue#2, education/teachers, GitHub. [Online]. Available: <https://github.com/education/teachers/issues/2>. [Accessed: 14-Oct-2016].
4. "Version control - University of Leicester". Ww2.le.ac.uk, 2016. [Online]. Available: <http://ww2.le.ac.uk/services/research-data/organise-data/version-control/>. [Accessed: 27-Dec-2016].