POLYTECHNIC OF LEIRIA
SCHOOL OF TECHNOLOGY AND MANAGEMENT
DEPARTMENT OF COMPUTER ENGINEERING

ADVANCED TOPICS IN SOFTWARE ENGINEERING – PROJECT DESCRIPTION

Bisca is a well-known Portuguese card game for two players, using a 40-card deck, with a trump suit and a draw ("biscar") phase. The game combines memory, strategy, and probability. Developing a digital version provides a rich domain for software engineering challenges: game logic, synchronization, UI/UX, persistence, and analytics, among others.

This project involves developing a mobile application for a single-player version of Bisca, where the user plays against a bot opponent. The goal is to produce a functional and visually appealing application that follows the principles of software engineering and agile development. A Centralized Support System (CSS), to be developed in another course, provides backend services such as user authentication, data synchronization, and management of coins and customizations.

Application Flow and Features

Login and Anonymous Mode:

When the app launches, users are greeted with a login screen. Registered users can log in to access all app features – including coins, history, scoreboards, and customizations. Anonymous users can skip login and play practice games only, but cannot play matches, earn coins, use customizations, access scoreboards and history. Personal bests ignore practice games.

Dashboard:

After logging in (or continuing as anonymous), the user is shown a dashboard that provides access to all main features, including: start a new single-player match against the bot; view game and match history; view personal and global scoreboards, access customization settings. For registered users, the dashboard displays the player's avatar, username, and coin balance.

Gameplay:

Each match consists of one or more games, each played according to Bisca rules (c.f. Appendix). Each player is dealt 9 cards; players take turns playing cards in tricks/rounds; the bot plays automatically, using rule-based logic to simulate realistic play. When all cards have been played, game points are calculated automatically; the first player to reach 4 games wins the match. After each match, a results screen is displayed with relevant information, such as match and game results, achievements (Capote/Bandeira), and coins earned. Capote and Bandeira achievements are game outcomes (c.f. Appendix A – Bisca Rules) that accelerate match scoring and drive bonus coin awards at match completion.

Game Coins and Actions

Registered players earn and spend game coins to enhance gameplay and personalization. Registered users must buy their match entry using coins (matches have an entry fee). Winning a match grants base coins (base win reward); Capote and Bandeira victories grant bonus coins. If the player's coin balance is insufficient, the action is disabled with a clear warning. Coin balances and transactions are synchronized with the CSS.

Notifications:
System-level notifications inform users about key events, including new leader of the global scoreboard; or availability of new customizations. Tapping a notification opens the relevant app screen.

History and Scoreboards:
Registered users can review their performance via History and Scoreboards. History lists all the user's matches and games, showing date, duration, result, coins earned, and trick-by-trick breakdown; can be filtered by date, result, achievements; and ordered by date. Scoreboards show: personal bests (number of matches and wins, win rate, Capote and Bandeira results); and global rankings (most matches won, most coins earned, most achievements). History and Scoreboards data is maintained in the CSS.

Customizations
Players can personalize their experience with custom decks and avatars. Available items are listed in the Customizations screen; only purchased items can be selected and applied. The avatar appears on the dashboard and during gameplay; deck designs modify card visuals during matches. Items should be purchased through the CSS. Selection persists across sessions.

Platform Interaction and Backend Support
The mobile app interacts with a Centralized Support System (CSS) providing: authentication, data storage, and statistics; coin and customization management; history and leaderboards. Teams may use a mock server/backend (e.g., Firebase) fulfilling these requirements.

Development Guidelines:
The project requires developing a mobile application. Each team chooses the technological stack (e.g., native Android or iOS development, cross-platform development using Flutter, mobile-first web app, …), but must implement all the described features. All software must be fully functional and tested. This course focuses on the software engineering process, so the project will be evaluated from both the process and the product perspectives.
Teams of four students will develop the project, applying agile principles and pair programming. Teams decide which features to deliver in each sprint. At the end of each sprint, a demo will show progress. Final delivery will include both the working app and process documentation.

Work Completion and Delivery:
- Final Grade = (65% * Process + 30% * Product + 5% ePortfolio) * Public Presentation Session

Process (65%):
- 35% – Planning and execution (commitment and delivery of planned features.).
- 30% – Project control (adaptation to the development process covered in lab classes including, among others, the proper use of: the version control and management system (Git), the planning support system (Jira), and the negotiation of pairs).

Product (30%):
- 30% – Implemented features and automated tests (functionality and quality).

ePortfolio (5%):
- c.f. Appendix B – ePortfolio Description

Appendix A – Bisca Rules

1. Overview

Bisca is a traditional Portuguese card game for two players, played with a 40-card deck (*baralho*). The objective is to win the most points by capturing valuable cards during tricks (*vazas*). The game includes a trump suit (*naipe de trunfo*) that outranks all others.

2. Deck and Setup

The game uses a 40-card deck, obtained by removing the eights, nines, and tens from a standard deck. The suits (*naipes*) are hearts (*copas*), diamonds (*ouros*), clubs (*paus*), and spades (*espadas*). Each player is dealt 9 cards (their hand, or *mão*). (In an alternative variant – 'Bisca de 3' – each player is dealt three cards.)

The last card of the deck is turned face up to reveal the trump suit. The remaining cards are placed face down on top of that card, leaving part of the trump visible beneath the deck throughout the game.

The non-dealer leads the first trick. During play, it is not permitted to look at cards that have already been played or that are in the piles of won tricks.

3. Card Values

The cards have the following point values: the Ace (*Ás*) is worth 11 points; the Seven (*Sete*, also called *Bisca* or *Manilha*) is worth 10; the King (*Rei*) is worth 4; the Jack (*Valete*) 3; and the Queen (*Dama*) 2. All other cards (2 to 6) have no point value. There are 120 points in total in the deck, and a player must reach 61 or more points to win a game.

4. Gameplay

The game proceeds through a series of tricks, in which each player plays one card per trick.

- First trick: the non-dealer leads. The opponent may play any card – there is no obligation to follow suit (*assistir*) while cards remain in the stock (*monte*).
- Determining the winner of a trick: if both cards are of the same suit, the higher-ranked one wins. If they are of different suits and one is of the trump suit, the trump wins. Otherwise, the first card played wins the trick.
- Drawing cards: After each trick, the winner draws the top card from the stock, followed by the loser. This continues until the stock is empty.
- Final phase: once there are no more cards to draw, players must follow suit (*assistir*) if they can. If unable to do so, they may play a trump or any other card. The winner of each trick collects the cards into their pile of won cards.
- Winning the game: when all cards have been played, both players total their points. The player with 61 or more points wins the game.

5. Match Scoring

Each game (*jogo*) contributes marks on a match (*partida*); the first player to reach four marks wins the match. A score between 61 and 90 points gives one mark (*risca* ou *moca*); 91 to 119 points gives two marks (*capote*); and 120 points counts as a clean match win (*bandeira*). A draw gives zero mark to each player.

Appendix B – ePortfolio Description

An e-portfolio is a digital collection of your work, skills, and experiences; it serves as a showcase of your achievements, especially in academic or professional contexts. For Advanced Topics in Software Engineering students, an e-portfolio can demonstrate their proficiency in various aspects related to the course. Students are, therefore, asked to complete the following tasks individually and submit adequate proof via Moodle:

1. Git
GitKraken is currently the Git tool of choice for developers. GitKraken launched a course and certification with the basic concepts of Git. It is available at: https://learn.gitkraken.com/courses/git-foundations. Sign up and complete the certification. Submit the proof of certification (badge).

2. Katalon Studio
The Katalon Academy (https://academy.katalon.com/) offers several online courses that aim to guide those interested in a self-learning approach. Sign up, watch and complete the course "Katalon Studio for Beginners: How to Create and Execute Automated Tests". Submit a screenshot that includes your name and the results obtained from the quizzes carried out throughout the course ("My Quiz Attempts").

3. Jira Software
"Atlassian Learning" offers some relevant learning paths (https://community.atlassian.com/learning/catalog?product=Jira&type=Learning+path). Follow the "Get the most out of Jira" and "Apply agile practices to manage your work" learning paths. Submit your learning paths' Certificates of Completion (available for download under "My learning / Complete").