Strathmore University

Bachelor of Informatics and Computer Science (BICS)

ICS 3.1 A

Human Computer Interaction

Milestone 2

Team Gru and His Minions

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Milestone 2: Conceptual Design and Prototyping

1. **Core Functionality List**

Revisited User Research Insights

Key pain points identified:

- Slow, manual grading and feedback processes
- Lack of visibility and transparency for students
- Time-consuming setup of assessments for lecturers
- Delayed feedback affecting learning outcomes

"How Might We..." Questions

- How might we help lecturers efficiently create and manage their assessments?
- How might we enable students to access and complete assessments easily?
- How might we provide instant, reliable feedback to students?
- How might we help lecturers and students track performance and progress effectively?

Feature Brainstorming (Raw Ideas)

- Assessment creation tools
- Auto-grading engine
- Real-time dashboards
- Notifications for students
- Scheduling and availability controls
- Feedback display

Prioritized Features

A. **Must Have**

- Lecturers must be able to create assessments in multiple formats (e.g., multiple choice, short answer). They can define correct answers, set scoring criteria, deadlines, and visibility options for each assessment.
- Students should be able to easily access assigned assessments, complete them within the allowed timeframe, and submit responses through a clean, mobile friendly interface

- The system should automatically grade objective questions using predefined correct answers and display instant scores and feedback upon submission.

B. Should Have

- Lecturers should have access to a dashboard displaying analytics of student performance per assessment. It should support viewing trends, individual performance, and exporting results if needed.
- Students should be able to view their assessment history, track their progress, review feedback, and monitor performance over time from a centralized dashboard.

C. Could Have

- Peer Grading options, AI-Generated feedback suggestions and group assessments.

D. Won't Have

- Voice-based assessments, LMS integration (e.g., Moodle, Canvas)

2. Conceptual Models and Appropriate Interface Metaphors

Conceptual Model

Our system adopts a **hybrid conceptual model,** blending object-based and action-based approaches to ensure both clarity and task alignment for different types of users (lecturers and students)

Object-Based Components

The system is organized around core academic data entities that users interact with regularly:

- Assessments - Include quizzes, tests, and assignments
- Questions - Multiple choice, open-ended, and other supported formats
- Feedback – Automatically or manually generated performance reports
- Users – Categorized as students or lecturers, each tailored with experiences

Action-Based Tasks

The system supports a structured set of user-driven actions that match the workflow of academic assessment:

- Create or upload assessments (lecturers)
- Attempt assessments (students)
- Auto-grade submissions (system driven)
- Receive feedback (students)
- View performance analytics (both users, based on role)

Interface Metaphors

i. **Folder Metaphor**

Organize assessments into units or courses, like physical or digital filing systems. Helps users navigate and group assessments logically.

ii. **Checkbox/To-Do List Metaphor**

Used to track complete, pending, or upcoming assessments. Encourages progress tracking and task management, especially for students.

iii. **Pen-and-Paper Metaphor**

Represents the assessment-taking experience with familiar visuals like blank spaces, answer boxes, and submission prompts. Reinforces the traditional test-taking environment in a digital format.

Rational for Chosen Metaphors

- They are deeply embedded in the academic context and naturally align with our use base's expectations.
- Students and lecturers are already accustomed to folders, checklists, and traditional exams, reducing the learning curve.
- The metaphors are applied throughout the system to maintain a coherent mental model
- Care is taken not to overextend metaphors like avoiding the literal emulation of physical paper where necessary.

3. User Flows and Wireframes

To visualize how users interact with our system, we developed detailed user flows and low-fidelity wireframes based on the core functionalities and conceptual models outlined earlier.
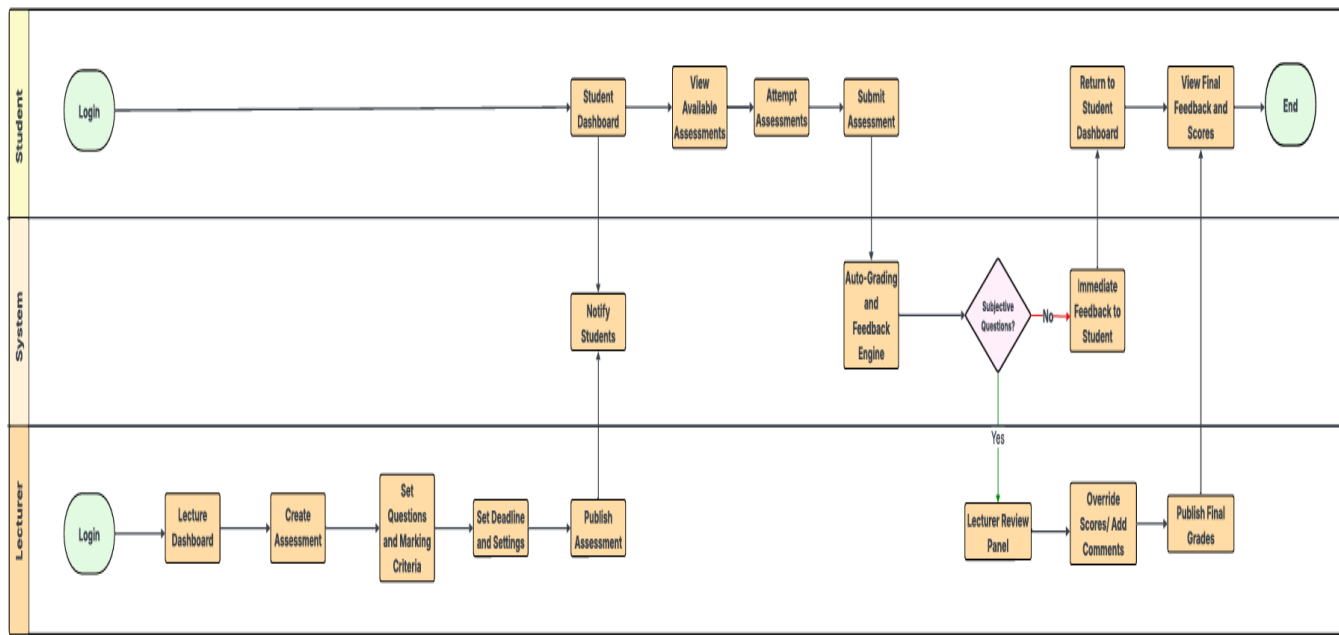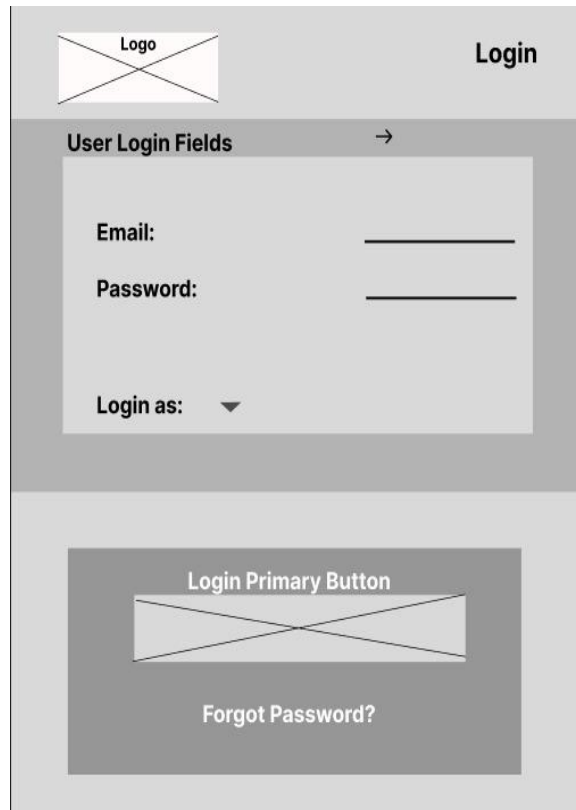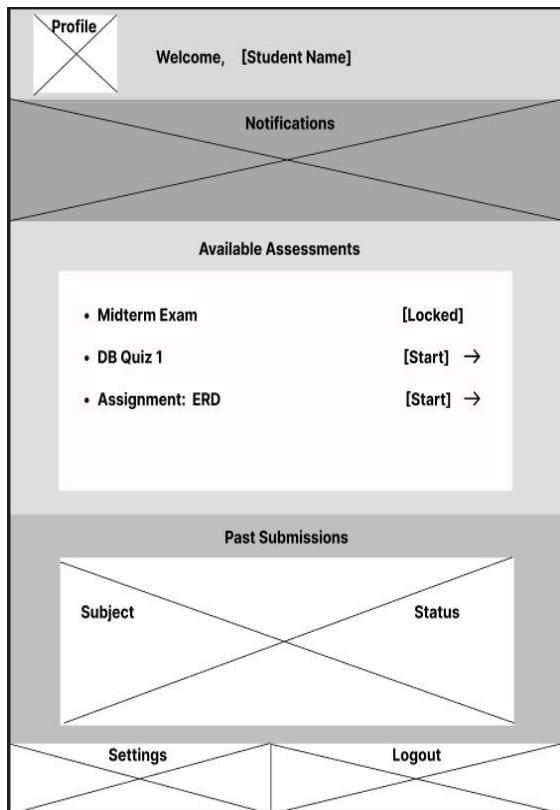
Figure 1User Flow

Wireframes

The students view:

Take Assessment

HCI Quiz 1   Timer

Question 1

Multiple Choice Answers

Question 2

Written Answers

Question 3

[Choose File]   [No file chosen]

[Submit Assessment]

Final Feedback
[Assessment Title]

Score: 72%

Question Feedback

Question 2 Feedback

Back to Dashboard

Lecturer's View:

Lecturer's Dashboard

+ New Assessment

Existing Assessments

Subject Under View	Status
DB CAT	Draft
HCI CAT	Published/Reviewed

Lecturer Navigation Menu

Create Assessment

Assessment Title

Type

Add Question

[+]   Add Question

Questions List:

1. What is DBMS?   [Edit] [X]

Set Deadline and Publish

Logo

Login

User Login Fields →

Email: _____

Password: _____

Login as: ▾

Login Primary Button

Forgot Password?

View Submissions ☰

Select Assessment

Student Submission Card

Student: Jane Doe

Status: Submitted

Score: 85%
[Review]

Student Submission Card

Review Submission ☰

Student: Cindy Ogutu

Question and Answer Provided by Student

Score: [___/10]

Feedback:

[Write Feedback here ....]

[Save and Next]

[Publish Final Grades]

Set Deadline and Settings ☰

Deadline:

[Select Date]

Time:

Select Time

Allow Late Submission?

() Yes   () No

Shuffle Questions?

[Toggle]

Publish Assessment

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4. Low-fidelity Interactive Prototypes Using Paper Prototypes

- We translated our wireframes into low-fidelity interactive prototypes using the paper prototyping method. The approach allows us to simulate user interactions without needing a functional digital interface.

- Below are screens represented on sheets of paper to bring out key interfaces.
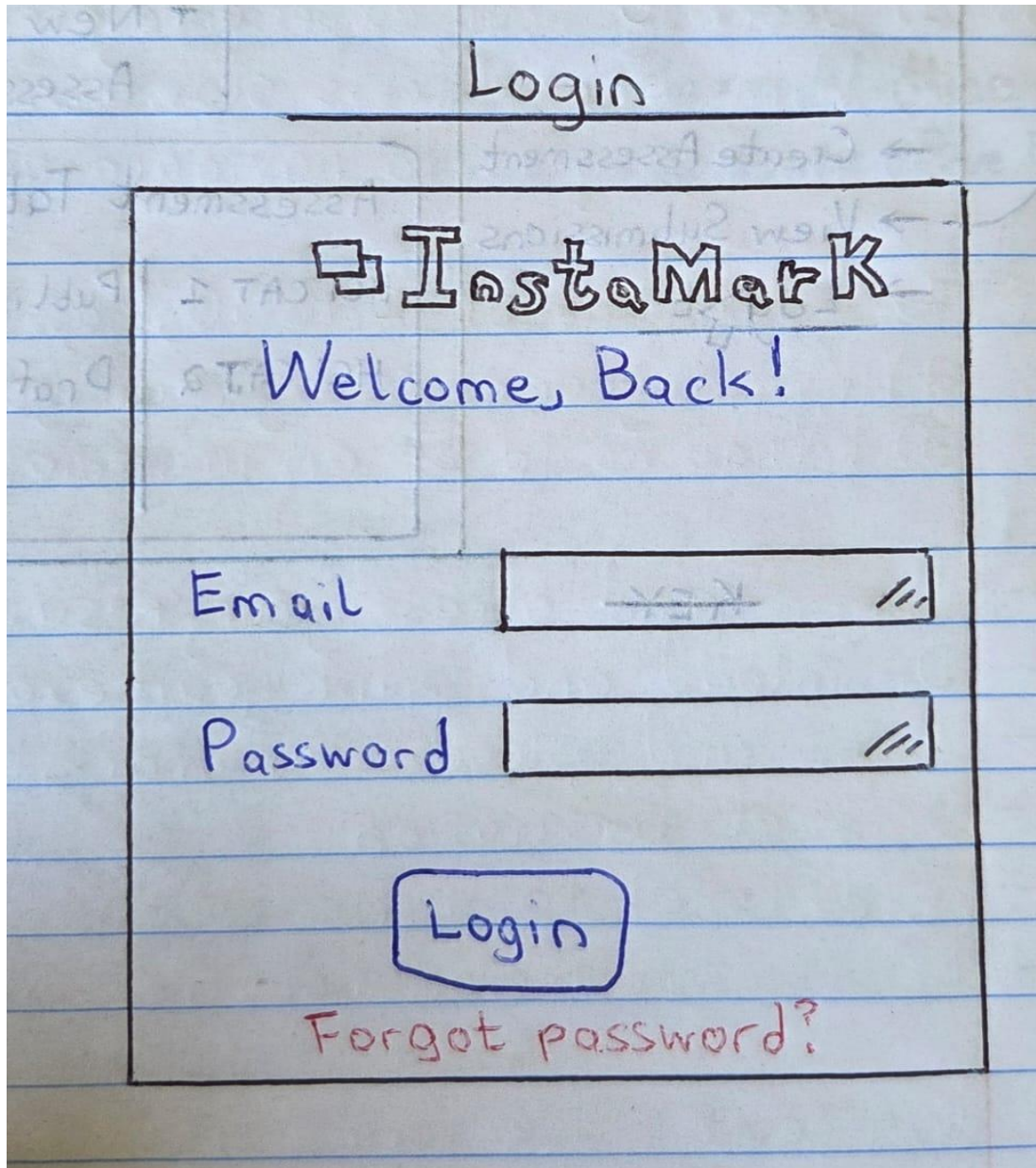
Low-Fidelity Paper Prototypes
Lecturer's Side

Lecturer's Dashboard ☰

+ New Assessment

Existing Assessments

Subject	Status
HCI CAT 1	Published

< ○ ☰

☰ Create Assessment

Title [_____]

Type [_____]

Add Question

+ [_____]

Questions:

1. What is a conceptual model? [Edit] [X]

(Publish) (Deadline)

Sidebar

Welcome! Dr. Macharia

→ Create Assessment

→ View Submissions

→ Logout

+ New Assessment

Assessment Table

HCI CAT 1	Published
HCI CAT 2	Draft

More Key Lecturer Operations

Lecturer checking how his students performed

~~Student checking her marks and commenting~~

View Submissions ☰

Selected Assessment

| Milestone 2 |

Student Submission Card

Student: Kristina Kemoi
Status: Submitted
Score: 4/4 (100%)
* Highest Student!

Feedback: [_____]

Review Submission ☰
Student: Kristina Kemoi

Selected Assessment

| Milestone 2 |

Score: 4/4 (100%)

Feedback:

[Excellent woI...]

| @ | A | B | C | D | E | F | G | H | I | " |
| O | J | K | L | M | N | O | P | Q | R | - |

Publish Grade

Lecturer Publishing students' grades after giving feedback

Settings ☰

Deadline:
Select Date: [_____]
Time: [_____]
Allow late submission?
☐ Yes   ☑ No
Shuffle Questions?
☑ Yes   ☐ No

Save

Lecturer changing the settings of his assessments
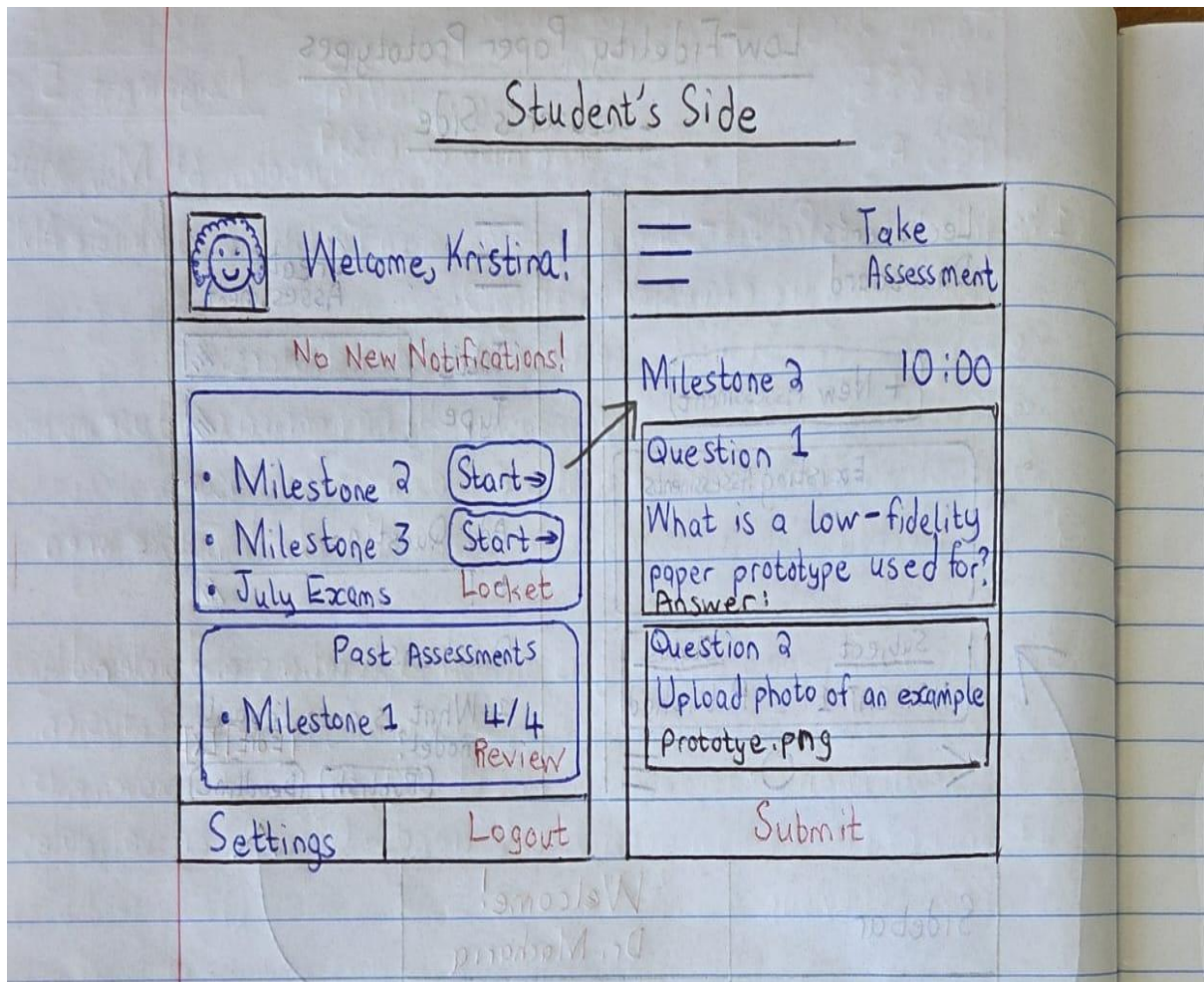
Final Feedback ☰

Score: 100%

Question 1 Feedback

[_____]

Question 2 Feedback

[_____]

Back to Dashboard

Lecturer giving his final feedback for the assessment

Low-fidelity Paper Prototypes

Student's Side

Welcome, Kristina!

No New Notifications!

- Milestone 2 (Start→)
- Milestone 3 (Start→)
- July Exams   Locked

Past Assessments
- Milestone 1   4/4
  Review

Settings | Logout

Take Assessment

Milestone 2   10:00

Question 1
What is a low-fidelity paper prototype used for?
Answer:

Question 2
Upload photo of an example
Prototye.png

Submit

5. Initial Concept Testing with Peers to Gather Early Feedback
   Methodology
- To validate the clarity, usability, and effectiveness of our conceptual model and wireframes, we conducted initial concept testing using a **low-fidelity paper prototype.**
- We recruited **four participants:** two professors and two students – representing both primary user groups of the system. Each participant was provided with a set of practical, role-appropriate scenarios, such as:
  - **For lecturers:** "Create a new assessment, then return later to edit and publish it."
  - **For students:** "Take a quiz, observe your progress, and submit it to view feedback."
- Participants were asked to think aloud as they interacted with the paper-based interface. A team member acted as the "system" using the **Wizard of Oz technique**,

manually switching paper screens in response to user actions. Each session lasted approximately **10 minutes**, during which we observed:

- Navigation hesitations
- Misunderstood interactions
- Spontaneous feedback and suggestions

- We followed up with clarifying questions such as:
    - "What did you expect this button to do?"
    - "Was anything unclear or unexpected?"

Key Findings

- Positive Feedback:
    - Students found the **quiz-taking process intuitive**, especially valuing the **instant feedback** after submission.
    - Lecturers appreciated the **speed and control** of publishing assessments and overriding grades when necessary.
- Usability Issues Identified:
    - **Unclear grading scope**: Participants were unsure which question types (e.g., multiple choice, true/false, image uploads) were supported by automatic grading.
    - **Missing draft functionality**: Lecturers asked whether assessments could be saved as drafts for future editing.
    - **Limited quiz navigation**: Students were curious if they could **skip or return** to questions and wanted more visibility over which questions remained unanswered.

Actionable Insights

- Based on this feedback, we identified the following changes to implement in future iterations**:**
    i.   For Students:
        - Add **"Skip"** and **"Back"** buttons to enable non-linear quiz navigation.
        - Include a **sidebar or progress tracker** highlighting unanswered questions.

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ii.   For Lecturers:

- Introduce a **"Save as Draft"** and **"Edit Draft"** option for assessments.

iii.   For Clarity and Guidance:

- Clearly **display supported question types** during the assessment creation process, particularly those compatible with automatic grading.