A Sport Injury and Illness Assessment and Tracking System

ระบบการประเมิณและติดตามการป้องกันการบาดเจ็บและเจ็บป่วยทางการกีฬา

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A SPORT INJURY AND ILLNESS ASSESSMENT AND TRACKING SYSTEM

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ABSTRACT

Injuries and illnesses as well as mental health are important as they affect an athlete's training and competition. Just like collecting data, it's also important. Because if an athlete's injury, illness, and mental health data is stored on paper or Google Forms, the form may be lost or difficult to process. Our system was created to assess and track athletes' injuries, illnesses and mental health through questionnaires based on OSTRC (Oslo Sports Injury Research Center) of all three parts. The scores of all three sections are calculated according to the OSTRC calculation method and are displayed to both athletes and medical teams in graphs and text. If an athlete's score exceeds the threshold set by the OSTRC, the athlete will be treated immediately to maintain the athlete and prevent the athlete from forcing his or her body to play or practice the sport.

KEYWORDS: INJURIES, ILLNESS, SPORT PSYCHOLOGY, ASSESSMENT, TRACKING SYSTEM, OSTRC

กระบวนการและการนำการป้องกันการบาดเจ็บและเจ็บป่วยมาใช้ในประเทศไทย

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บทคัดย่อ

การบาดเจ็บและเจ็บป่วยตลอดจนสภาพจิตใจมีความสำคัญเนื่องจากส่งผลต่อการฝึกและการแข่งขันของนักกีฬา เช่นเดียวกับการรวบรวมข้อมูล ก็มีความสำคัญเช่นกัน เพราะหากข้อมูลการบาดเจ็บ ความเจ็บป่วย และสภาพจิตใจของนักกีฬาถูกจัดเก็บไว้ในกระดาษหรือ GOOGLE ฟอร์ม แบบฟอร์มอาจสูญหายหรือดำเนินการได้ยาก ระบบของเราสร้างขึ้นเพื่อประเมินและติดตามการบาดเจ็บ ความเจ็บป่วย และสุขภาพจิตของนักกีฬาผ่านแบบสอบถามตาม OSTRC (ศูนย์วิจัยการบาดเจ็บทางกีฬาออสโล) ของทั้งสามส่วน คะแนนของทั้งสามส่วนคำนวณตามวิธีการคำนวณของ OSTRC และแสดงให้ทั้งนักกีฬาและทีมแพทย์แสดงเป็นกราฟและข้อความ หากคะแนนของนักกีฬาเกินเกณฑ์ที่กำหนดโดย OSTRC นักกีฬาจะได้รับการรักษาทันทีเพื่อรักษานักกีฬาและป้องกันไม่ให้นักกีฬาบังคับร่างกายของตนให้เล่นหรือฝึกซ้อมกีฬา

KEYWORDS: บาดเจ็บ, เจ็บป่วย, จิตวิทยาการกีฬา, ประเมิน, ระบบติดตาม, OSTRC

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CHAPTER 1

INTRODUCTION

In this chapter, there are 6 parts of introduction which are Motivation, Problem Statement, Objectives of the Project, Scope of the Project, Expected Benefits of the Project, and Organization of the Document. Their focus will be on how the application was developed, why there is a need for the application, and what were the benefits of the application.

1.1 **Motivation**

Injuries and illnesses are common problems for athletes since they can affect the way the athletes train and play in a competition. Therefore, it is important to keep monitoring athletes by regularly inquiring them about their physical condition and whether they have injuries or illnesses. The data obtained from such inquiries can help coaches in planning training sessions and competitions. In addition, the data can help medical teams (e.g., general practitioners, specialists, physical therapists) monitor, prevent, and promptly treat such injuries and illnesses. Other than injuries and illnesses, athletes' sleep quality and duration can also affect the effectiveness of their practice and competitions as well as affect their mental state and confidence in training and competition. Thus, it is important to regularly inquire athletes about their sleep quality and duration as well as their mental state and confidence. The data obtained from such inquiry can help coach and sports psychologists assess situations and plan the training session and competitions.

1.2 **Problem Statement**

The inquiries of data about athletes' physical conditions (e.g., injuries and illnesses) as well as mental conditions (e.g., sleep quality and duration and mental state and confidence) are conducted in the form of questionnaires which can be presented in either paper or electronic format (via google form). The questionnaires are weekly conducted to each athlete. The result of the questionnaires is kept in a variety of formats (e.g., paper, and electronic files). We can see that there are a variety of formats for collecting the physical and the mental conditions data. In addition, the quality of data is growing over time and processing such data is challenging, troublesome, and tedious. In this project, we have developed A Sport Injury and Illness Assessment and Tracking System (SIATS) to help facilitate the mental conditions SIATS collects the data and store it. Athletes use SAITS to assess and track their physical and mental conditions via a set of questionnaires presented on the webpage. Coaches and medical team can use SIATS to track the information about athlete's physical and mental conditions. Such information can help coaches plan the training sessions and the competitions and help medical team prevent and promptly treat the injury, the illness and the mental problem that may occur with the athletes.

1.3 **Objectives of the Project**

- To develop SIATS which is a system that can manage information about sport injury as well as sport psychology.
- To allow athletes to be able to track their current status of both physical and mental health.
- To allow coaches and medical teams staffs to be able to use athletes’ health information and give coaching and treatment feedback to individual athletes.

1.4 **Scope of the Project**

A computerized assessment system that allows athletes to check their condition through online channels. The application is designed to facilitate both athletes and coaches, as well as medical personnel while elevating the need for teams having to shadow athletes. Additionally, the application allows both athletes and staff to view the athlete statistics.

1.5 **Expected Benefits**

Benefits to users

- To hope that athletes are ready for competition
- To allow athletes to check the condition of readiness weekly by the medical team

Benefit to developers

- To practice using the database in real work
- To practice creating applications.
- Develop programming skills such as Java, PHP.
- Improving problem-solving skills.

1.6 **Organization of the Document**

This project consists of 6 chapters including:

1. The first chapter introduces the project. The Motivation, Problem Statement, Project Objectives, Project Scope, Expected Benefits for Users and Developers, and Document Organization are all included in the Introduction.

2. The second chapter contains background knowledge which includes literature review.
3. The third chapter presents the Analysis and Design of the project. It contains information on the project's design, including an overview of the system architecture, a system structure chart, and the design of the web-based service.
4. The fourth chapter presents the Implementation contains hardware and system environment and Implementation Guide and Techniques.
5. The fifth chapter contains testing and evaluation process, spread pattern results, and discussion
6. The sixth chapter contains conclusion, benefits, problem and limitations, and future work.

CHAPTER 2

BACKGROUND

This chapter contains 2 parts that is literature reviews background knowledge.

2.1 Background knowledge

In the application, there will be three types of questionnaires, health, overuse, and sports psychology. The health questionnaire is a question about problems in illness such as Fever, Fatigue/malaise, swollen glands, Sore throat, etc. The overuse questionnaire is a question about the injury problems in each part of the body. The sport psychology questionnaire is a question that will ask about the athlete's mental health such as readiness to compete and training, and sleep quality. The main language of the application is English and there will be support for the Thai language by the support teams of Sport Science faculty that were translated from original English to Thai.

Table 2.1 Comparison between Thai and English in OSTRC Health questionnaires

Thai version	English version
คุณมีปัญหาด้านอาการเจ็บป่วยหรือไม่ • ใช่ • ไม่มี	Do you have an illness problem? • Yes • No
1. ใน 7 วันที่ผ่านมาปัญหาการบาดเจ็บการเจ็บป่วย หรือปัญหาสุขภาพอื่นๆ ของท่านทำให้การฝึกซ้อมหรือการแข่งขันกีฬามีปัญหาหรือไม่ • เข้าร่วมการฝึกซ้อมหรือแข่งขันกีฬาได้เต็มที่ โดยไม่มีปัญหาการบาดเจ็บ,เจ็บป่วย หรือปัญหาสุขภาพ • เข้าร่วมการฝึกซ้อมหรือแข่งขันกีฬาได้เต็มที่แต่มีปัญหาการบาดเจ็บ,เจ็บป่วย หรือปัญหาสุขภาพ • เข้าร่วมการฝึกซ้อมหรือแข่งขันกีฬาได้ไม่เต็มที่เพราะมีปัญหาการบาดเจ็บ,เจ็บป่วย หรือปัญหาสุขภาพ	Have you had any difficulties participatingin normal training and competition due to injury, illness, or other health problems during the past week? • Full participation without healthproblems. • Full participation, but with injury/illness. • Reduced participation due to injury/illness. • Cannot participate due to

• ไม่สามารถเข้าร่วมการฝึกซ้อมหรือแข่งขันกีฬาได้เพราะมีปัญหาการบาดเจ็บ,เจ็บป่วย หรือปัญหาสุขภาพ	injury/illness.
2. ใน 7 วันที่ผ่านมา ปัญหาการบาดเจ็บการเจ็บป่วย หรือปัญหาสุขภาพ ของท่านส่งผลกระทบต่อปริมาณการ ฝึกซ้อมหรือแข่งขันมากน้อยเท่าไหร่ • ไม่ลดลง • ลดลงเล็กน้อย • ลดลงปานกลาง • ลดลงอย่างมาก • ไม่สามารถเข้าร่วมได้เลย	To what extent have you reduced you training volume due to injury, illness, or other health problems during the past week? • No reduction • To a minor extent • To a moderate extent • To a major extent • Cannot participate at all
3. ใน 7 วันที่ผ่านมา ปัญหาการบาดเจ็บการเจ็บป่วย หรือปัญหาสุขภาพ ของท่านส่งผลกระทบต่อความสามารถ ในการเล่นกีฬามากน้อยเท่าไหร่ • ไม่ลดลง • ลดลงเล็กน้อย • ลดลงปานกลาง • ลดลงอย่างมาก • ไม่สามารถเข้าร่วมได้เลย	To what extent has injury, illness or otherhealth problems affected your performance during the past week? • No effect • To a minor extent • To a moderate extent • To a major extent • Cannot participate at all
4. ใน 7 วันที่ผ่านมา ท่านมีปัญหาการบาดเจ็บ การเจ็บป่วย หรือปัญหาสุขภาพมากน้อยเพียงใด • ไม่สามารถเข้าร่วมได้เลย • มีอาการหรือปัญหาสุขภาพเล็กน้อย • มีอาการหรือปัญหาสุขภาพพอประมาณ • มีอาการหรือปัญหาสุขภาพอย่างมาก	To what extent have you experienced symptoms/health complaints during the past week? • No symptoms/health complaints • To a mild extent • To a moderate extent • To a severe extent • Cannot participate at all
5. อาการป่วย • ไข้ • อ่อนล้า • ต่อมอักเสบ • เจ็บคอ	Illness part • fever • Fatigue/malaise • Swollen gland • sore throat

• คัดจมูก/น้ำมูกไหล/จาม • ไอ • หายใจลำบาก • ปวดหัว • คลื่นไส้ • อาเจียน • ท้องเสีย • ท้องผูก • เป็นลม • ผื่นคัน • หัวใจเต้นผิดปกติ • เจ็บหน้าอก • ปวดเมื่อยกล้ามเนื้อส่วนท้อง • ความเจ็บปวดอื่นๆ • ชา • ความวิตกกังวล • หดหู่/เศร้า • หงุดหงิดง่าย • อาการบริเวณตา • อาการบริเวณหู • อาการที่ทางเดินปัสสาวะและอวัยวะเพศ	• blocked nose, running nose, sneezing • cough • difficulty breathing • headache • Nausea • vomiting • diarrhea • constipation • fainting • rash/itchiness • irregular pulse/arrhythmia • chest pain/angina • abdomen pain • other pain • Numbness/pins and needles • anxiety • depression • irritability • eye symptoms • ear symptoms • Symptoms form urinary tract and genitals
ใน 1 สัปดาห์ที่ผ่านมา กรุณาระบุจำนวนวันที่คุณพลาดการฝึกซ้อมหรือแข่งขัน เนื่องจากปัญหาที่ได้กล่าวมานี้ • 0 1 2 3 4 5 6 7	Please state the number of days over the past 7-day period that you have had to completely miss training or competition due to this problem. • 0 1 2 3 4 5 6 7
ครั้งนี้คือครั้งแรกที่ท่านได้ลงทะเบียนปัญหาในประเด็นนี้ในระบบนี้ใช่หรือไม่ • ใช่ เป็นครั้งแรก • ไม่ใช่ ข้าพเจ้าได้รายงานปัญหาเรื่องนี้มาแล้วในช่วงหนึ่งเดือนที่ผ่านมา • ไม่ใช่ ข้าพเจ้าได้รายงานปัญหาเรื่องนี้มาแล้ว นานมากกว่าในช่วงหนึ่งเดือนที่ผ่านมา	Is this the first time you have registered this problem through this monitoring system? • Yes, this is the first time • No, I have reported the same problem in one of the previous four weeks • No, I have reported the same problem previously, but it was more than four weeks ago
ข้าพเจ้าได้รายงานปัญหานี้กับบุคลากรดังกล่าวนี้กับ • แพทย์เวชศาสตร์การกีฬาประจำทีม/สโมสร • นักกายภาพบำบัดการกีฬาประจำทีม/สโมสร • แพทย์เวชศาสตร์การกีฬาที่อื่น • นักกายภาพบำบัดการกีฬาที่อื่น	I have reported this problem to ... • Olympic team doctor • Olympic team physiotherapist • Other Olympiatoppen doctor • Other Olympiatoppen physiotherapist

กรุณาใช้พื้นที่นี้ในการให้ข้อมูลเพิ่มเติมเกี่ยวกับปัญหากับทีมทางการแพทย์ของคุณ • เติมลงในช่องว่าง	Please use this field to send additional information about this problem to your Olympic medical team • Fill the blank
9. คุณมีปัญหาด้านอาการบาดเจ็บอื่นๆ หรือไม่ • มี • ไม่มี	Do you have another Injury problem? • Yes • No

Table 2.2 Comparison between Thai and English in OSTRC Overuse questionnaires

Thai version	English version
ท่านมีอาการบาดเจ็บ หรือไม่ • มี • ไม่มี	Do you have an injury problem? • Yes • No
บริเวณที่บาดเจ็บ • หัวและหน้า • คอ • หัวไหล่/ไหปลาร้า • ต้นแขน • ข้อศอก • แขนท่อนล่าง • ข้อมือ • มือและนิ้ว • หน้าอก/ซี่โครง • หน้าท้อง • กระดูกสันหลังทรวงอก • กระดูกสันหลังส่วนล่าง • เชิงกราน/ก้น • สะโพก/ขาหนีบ • ต้นขา • เข่า • ขาท่อนล่าง • ข้อเท้า • เท้าและนิ้วเท้า	Injury part • Head • Neck • Shoulder • upper arm • elbow • lower arm • wrist • hand and finger • chest and ribs • abdomen • thoracic spine • lower spine • pelvis and buttocks • hip and groin • thigh • knee • lower leg • ankle • feet and toes
เลือกระดับความเจ็บปวดของร่างกาย • 1 ถึง 10	Select the body part pain level • 1 to 10
1.ใน 7 วันที่ผ่านมา ปัญหา (Location)ของท่านทำให้การเข้าร่วมฝึกซ้อมหรือแข่งขันกีฬามีปัญหาหรือไม่ • เข้าร่วมการฝึกซ้อมหรือแข่งขันกีฬาได้เต็มที่ โดยไม่มีปัญหา(Location)	Have you had any difficulties participating in training and competition due to (Location) problems during the past 7 days?

• เข้าร่วมการฝึกซ้อมหรือแข่งขันกีฬาได้เต็มที่ แต่มีปัญหา(Location) • เข้าร่วมการฝึกซ้อมหรือแข่งขันกีฬาได้ไม่เต็มที่ เพราะมีปัญหา(Location) • ไม่สามารถเข้าร่วมการฝึกซ้อมหรือแข่งขันกีฬาได้เลย เพราะมีปัญหา(Location)	• Full participation without (Location) problems. • Full participation, but with (Location) problems • Reduced participation due to (Location) problems • Could not participate due to (Location) problems.
2. ใน 7 วันที่ผ่านมา ปัญหา (Location)ของท่านส่งผลกระทบต่อการฝึกซ้อมหรือแข่งขันมากน้อยเพียงใด • ไม่ส่งผลกระทบต่อการฝึกซ้อมหรือแข่งขันเลย • การฝึกซ้อมหรือแข่งขันลดลงเล็กน้อย • การฝึกซ้อมหรือแข่งขันลดลงปานกลาง • การฝึกซ้อมหรือแข่งขันลดลงอย่างมาก • ไม่สามารถเข้าร่วมการฝึกซ้อมหรือแข่งขันได้เลย	To what extent have you modified your training or competition due to (Location) problems during the past 7 days? • No modification • To a minor extent • To a moderate extent • To a major extent • Cannot participate at all
3.ใน 7 วันที่ผ่านมา ปัญหา (Location)ของคุณส่งผลกระทบต่อความสามารถในการเล่นกีฬามากน้อยเพียงใด • ไม่ส่งผลกระทบต่อความสามารถในการเล่นกีฬาเลย • ความสามารถในการเล่นกีฬาลดลงเล็กน้อย • ความสามารถในการเล่นกีฬาลดลงปานกลาง • ความสามารถในการเล่นกีฬาลดลงอย่างมาก • ไม่สามารถเข้าร่วมการฝึกซ้อมหรือแข่งขันได้เลย	To what extent have (Location) problems affected your performance during the past 7days? • No effect • To a minor extent • To a moderate extent • To a major extent • Cannot participate at all
4.ใน 7 วันที่ผ่านมาอาการเจ็บปวดของ (Location)ของท่านซึ่งเป็นผลมาจากการเข้าร่วมการแข่งขัน/ ฝึกซ้อมกีฬาอยู่ในระดับใด • ไม่เจ็บเลย • เจ็บเล็กน้อย • เจ็บพอประมาณ • เจ็บมาก	To what extent have you experienced Head pain related to your sport during the past 7 days? • No pain • Mild pain • Moderate pain • Severe pain
5. ใน 1 สัปดาห์ที่ผ่านมา กรุณาระบุจำนวนวันที่คุณพลาดการฝึกซ้อมหรือแข่งขัน เนื่องจากปัญหาที่ได้กล่าวมานี้ • 0 1 2 3 4 5 6 7	Please state the number of days over the past 7-day period that you have had to completely miss training or competition due to this problem. • 0 1 2 3 4 5 6 7
6.ครั้งนี้คือครั้งแรกที่ท่านได้ลงทะเบียนปัญหาในประเด็นนี้ในระบบนี้ใช่หรือไม่ • ใช่ เป็นครั้งแรก • ไม่ใช่ ข้าพเจ้าได้รายงานปัญหาเรื่องนี้มาแล้วในช่วงหนึ่งเดือนที่ผ่านมา	Is this the first time you have registered this problem through this monitoring system? • Yes, this is the first time • No, I have reported the same problem in one of the previous four weeks

• ไม่ใช่ ข้าพเจ้าได้รายงานปัญหาเรื่องนี้มาแล้ว นานมากกว่าในช่วงหนึ่งเดือนที่ผ่านมา	• No, I have reported the same problem previously, but it was more than four weeks ago
7.ข้าพเจ้าได้รายงานปัญหานี้กับบุคลากรดังกล่าวนี้กับ • แพทย์เวชศาสตร์การกีฬาประจำทีม/สโมสร • นักกายภาพบำบัดการกีฬาประจำทีม/สโมสร • แพทย์เวชศาสตร์การกีฬาที่อื่น • นักกายภาพบำบัดการกีฬาที่อื่น	I have reported this problem to ... • Olympic team doctor • Olympic team physiotherapist • Other Olympiatoppen doctor • Other Olympiatoppen physiotherapist
8.กรุณาใช้พื้นที่นี้ในการให้ข้อมูลเพิ่มเติมเกี่ยวกับปัญหากับทีมทางการแพทย์ของคุณ • เติมลงในช่องว่าง	Please use this field to send additional information about this problem to your Olympic medical team • Fill the blank

Table 2.3 Comparison between Thai and English in Sport psychology questionnaires

Thai version	English version
ในช่วงระยะเวลา 1 เดือนที่ผ่านมาส่วนใหญ่ ท่านมักเข้านอนเวลากี่โมง	During the past month, when have you usually gone to bed at night? • 1 to 24
ในช่วงระยะเวลา 1 เดือนที่ผ่านโดยปกติคุณใช้เวลานานเท่าใด (เป็นนาที) ในการนอนหลับในแต่ละคืน? • ป้อนช่วงเวลาเป็นนาที	During the past month, how long (in minutes) has it usually takes you to fall asleep each night? • enter time interval in minutes
ในช่วงระยะเวลา 1 เดือนที่ผ่านมาส่วนใหญ่ท่นตื่นนอนตอนเช้าเป็นเวลากี่โมง • 1 ถึง 24	During the past month, when have you usually gotten up in the morning? • 1 to 24
ในช่วงระยะเวลา 1 เดือนที่ผ่านมา ท่านนอนหลับได้จริงเป็นเวลากี่ชั่วโมงต่อคืน • ป้อนช่วงเวลาเป็นนาที	During the past month, how many hours of actual sleep did you get at night? • enter time interval in minutes
นอนไม่หลับหลังจากเข้านอนไปแล้วนานกว่า 30 นาที • ไม่เคยเลย ในช่วงระยะเวลา 1 เดือนที่ผ่านมา • น้อยกว่า 1 ครั้งต่อสัปดาห์ • 1 หรือ 2 ครั้งต่อสัปดาห์ • 3ครั้งต่อสัปดาห์ขึ้นไป	cannot get sleep within 30 minutes • Not during the past month • Less than once a week • Once or twice a week • Three or more times a week
รู้สึกตัวตื่นขึ้นระหว่างนอนหลับกลางดึกหรือตื่นเช้ากว่าเวลาที่ตั้งใจไว้ • ไม่เคยเลย ในช่วงระยะเวลา 1 เดือนที่ผ่านมา • น้อยกว่า 1 ครั้งต่อสัปดาห์ • 1 หรือ 2 ครั้งต่อสัปดาห์ • 3ครั้งต่อสัปดาห์ขึ้นไป	wake up in the middle of the night or early morning • Not during the past month • Less than once a week • Once or twice a week • Three or more times a week
ตื่นเพื่อไปเข้าห้องน้ำ • ไม่เคยเลย ในช่วงระยะเวลา 1 เดือนที่ผ่านมา	have to get up to use the bathroom • Not during the past month

• น้อยกว่า 1 ครั้งต่อสัปดาห์ • 1 หรือ 2 ครั้งต่อสัปดาห์ • 3ครั้งต่อสัปดาห์ขึ้นไป	• Less than once a week • Once or twice a week • Three or more times a week
หายใจไม่สดวก • ไม่เคยเลย ในช่วงระยะเวลา 1 เดือนที่ผ่านมา • น้อยกว่า 1 ครั้งต่อสัปดาห์ • 1 หรือ 2 ครั้งต่อสัปดาห์ • 3ครั้งต่อสัปดาห์ขึ้นไป	cannot breathe comfortably • Not during the past month • Less than once a week • Once or twice a week • Three or more times a week
ไอ กรน เสียงดัง • ไม่เคยเลย ในช่วงระยะเวลา 1 เดือนที่ผ่านมา • น้อยกว่า 1 ครั้งต่อสัปดาห์ • 1 หรือ 2 ครั้งต่อสัปดาห์ • 3ครั้งต่อสัปดาห์ขึ้นไป	cough or snore loudly • Not during the past month • Less than once a week • Once or twice a week • Three or more times a week
รู้สึกหนาวเกินไป • ไม่เคยเลย ในช่วงระยะเวลา 1 เดือนที่ผ่านมา • น้อยกว่า 1 ครั้งต่อสัปดาห์ • 1 หรือ 2 ครั้งต่อสัปดาห์ • 3ครั้งต่อสัปดาห์ขึ้นไป	feel too cold • Not during the past month • Less than once a week • Once or twice a week • Three or more times a week
รู้สึกร้อนเกินไป • ไม่เคยเลย ในช่วงระยะเวลา 1 เดือนที่ผ่านมา • น้อยกว่า 1 ครั้งต่อสัปดาห์ • 1 หรือ 2 ครั้งต่อสัปดาห์ • 3ครั้งต่อสัปดาห์ขึ้นไป	feel too hot • Not during the past month • Less than once a week • Once or twice a week • Three or more times a week
ฝันร้าย • ไม่เคยเลย ในช่วงระยะเวลา 1 เดือนที่ผ่านมา • น้อยกว่า 1 ครั้งต่อสัปดาห์ • 1 หรือ 2 ครั้งต่อสัปดาห์ • 3ครั้งต่อสัปดาห์ขึ้นไป	had bad dream • Not during the past month • Less than once a week • Once or twice a week • Three or more times a week
รู้สึกปวด • ไม่เคยเลย ในช่วงระยะเวลา 1 เดือนที่ผ่านมา • น้อยกว่า 1 ครั้งต่อสัปดาห์ • 1 หรือ 2 ครั้งต่อสัปดาห์ • 3ครั้งต่อสัปดาห์ขึ้นไป	have pain • Not during the past month • Less than once a week • Once or twice a week • Three or more times a week
เหตุผลอื่นๆ • เติมลงในช่องว่าง	Other reason(s), please describe • Fill the blank
ในช่วงระยะเวลา 1 เดือนที่ผ่านมา ท่านคิดว่าคุณภาพการนอนหลับโดยรวมของท่านเป็นอย่างไร • ดีมาก • ค่อนข้างดี	During the past month, how would you rate your sleep quality overall? • Very good • Fairly good

• ค่อนข้างแย่ • แย่มาก	• Fairly bad • Very bad
ในช่วงระยะเวลา 1 เดือนที่ผ่านมา ท่านใช้ยาเพื่อช่วยในการนอนหลับบ่อยเพียงใด(ไม่ว่าจะตามใบสั่งแพทย์ หรือซื้อมาเอง) • ไม่เคยเลย ในช่วงระยะเวลา 1 เดือนที่ผ่านมา • น้อยกว่า 1 ครั้งต่อสัปดาห์ • 1 หรือ 2 ครั้งต่อสัปดาห์ • 3ครั้งต่อสัปดาห์ขึ้นไป	During the past month, how often have you take medicine (prescribe or "over the counter") to help you sleep? • Not during the past month • Less than once a week • Once or twice a week • Three or more times a week
ในช่วงระยะเวลา 1 เดือนที่ผ่านมา ท่านมีปัญหาง่วงนอนหรือเผลอหลับขณะขับขี่ยานพาหนะ, ขณะรับประทานอาหารหรือขณะเข้าร้วมกิจกรรมทางสังคมต่างๆ บ่อยเพียงใด • ไม่เคยเลย ในช่วงระยะเวลา 1 เดือนที่ผ่านมา • น้อยกว่า 1 ครั้งต่อสัปดาห์ • 1 หรือ 2 ครั้งต่อสัปดาห์ • 3ครั้งต่อสัปดาห์ขึ้นไป	During the past month, how often have you had trouble staying awake while driving, eating meals, or engaging in social activity? • Not during the past month • Less than once a week • Once or twice a week • Three or more times a week
ในช่วงระยะเวลา 1 เดือนที่ผ่านมา ท่านมีปัญหาเกี่ยวกับความกระตือรือร้นในการทำงานให้สำเร็จมากน้อยเพียงใด • ไม่มีปัญหา • มีปัญหาเพียงเล็กน้อย • มีปัญหา • มีปัญหาอย่างมาก	During the past month, how much of a problem has it been for you to keep up enough enthusiasm to get things done? • No problem at all • Only a very slight problem • Somewhat of a problem • A very big problem
ท่านมีคู่นอน, เพื่อนร่วมห้องหรือผู้อาศัยอยู่ในบ้านหลังเดียวกันหรือไม่ • มี • ไม่มี	Do you have roommate? • Yes • No
หากคุณมีเพื่อนร่วมห้องหรือคู่นอน ให้ถามเขา/เธอว่าคุณมีอาการกรนเสียงดังบ่อยแค่ไหนในเดือนที่ผ่านมา • ไม่เคยเลย ในช่วงระยะเวลา 1 เดือนที่ผ่านมา • น้อยกว่า 1 ครั้งต่อสัปดาห์ • 1 หรือ 2 ครั้งต่อสัปดาห์ • 3ครั้งต่อสัปดาห์ขึ้นไป	If you have roommate or bed partner, ask him/her how often in the past month you have had Loud snoring • Not during the past month • Less than once a week • Once or twice a week • Three or more times a week
หากคุณมีเพื่อนร่วมห้องหรือคู่นอน ให้ถามเขา/เธอว่าคุณมีมีช่วงหยุดหายใจเป็นระยะเวลาหนึ่งขณะหลับบ่อยแค่ไหนในเดือนที่ผ่านมา • ไม่เคยเลย ในช่วงระยะเวลา 1 เดือนที่ผ่านมา • น้อยกว่า 1 ครั้งต่อสัปดาห์ • 1 หรือ 2 ครั้งต่อสัปดาห์ • 3ครั้งต่อสัปดาห์ขึ้นไป	If you have roommate or bed partner, ask him/her how often in the past month you have had long pauses between breaths while asleep • Not during the past month • Less than once a week • Once or twice a week • Three or more times a week

หากคุณมีเพื่อนร่วมห้องหรือคู่นอน ให้ถามเขา/เธอว่าคุณมีกล้ามเนื้อขากระตุกขณะนอนหลับบ่อยแค่ไหนในเดือนที่ผ่านมา • ไม่เคยเลย ในช่วงระยะเวลา 1 เดือนที่ผ่านมา • น้อยกว่า 1 ครั้งต่อสัปดาห์ • 1 หรือ 2 ครั้งต่อสัปดาห์ • 3ครั้งต่อสัปดาห์ขึ้นไป	If you have roommate or bed partner, ask him/her how often in the past month you have had legs twitching or jerking while you sleep • Not during the past month • Less than once a week • Once or twice a week • Three or more times a week
หากคุณมีเพื่อนร่วมห้องหรือคู่นอน ให้ถามเขา/เธอว่าคุณมีอาการมึนงงหรือตกใจตื่นขณะนอนหลับบ่อยแค่ไหนในเดือนที่ผ่านมา • ไม่เคยเลย ในช่วงระยะเวลา 1 เดือนที่ผ่านมา • น้อยกว่า 1 ครั้งต่อสัปดาห์ • 1 หรือ 2 ครั้งต่อสัปดาห์ • 3ครั้งต่อสัปดาห์ขึ้นไป	If you have roommate or bed partner, ask him/her how often in the past month you have had episodes of disorientation or confusion during sleep • Not during the past month • Less than once a week • Once or twice a week • Three or more times a week
อาการอื่นๆ ที่รบกวนขณะนอนหลับ โปรดระบุ..... • เติมลงในช่องว่าง	Other restlessness while you sleep • Fill the blank
ความมั่นใจโดยรวมในการกลับมาเล่นกีฬา • 0 1 2 3 4 5 6 7 8 9 10	My overall confidence to play is: • 0 1 2 3 4 5 6 7 8 9 10
ความมั่นใจในการกลับมาเล่นโดยไม่เจ็บ • 0 1 2 3 4 5 6 7 8 9 10	My confidence to play without pain is: • 0 1 2 3 4 5 6 7 8 9 10
ความมั่นใจที่จะทุ่มเท 100% • 0 1 2 3 4 5 6 7 8 9 10	My confidence to give 100% effort is: • 0 1 2 3 4 5 6 7 8 9 10
ความมั่นใจที่จะไม่กังวลกับส่วนที่เคยบาดเจ็บ • 0 1 2 3 4 5 6 7 8 9 10	My confidence to not concentrate on the injury is: • 0 1 2 3 4 5 6 7 8 9 10
ความมั่นใจว่าส่วนที่เคยบาดเจ็บจะกลับมาเล่นได้ไหว • 0 1 2 3 4 5 6 7 8 9 10	My confidence in the injured body part to handle demands of the situation is: • 0 1 2 3 4 5 6 7 8 9 10
ความมั่นใจในความสามารถของฉัน • 0 1 2 3 4 5 6 7 8 9 10	My confidence in my skill level/ability is: • 0 1 2 3 4 5 6 7 8 9 10

2.2 Literature Review

2.1.1 The Oslo Sports Trauma Research Center questionnaire on health problems: a new approach to prospective monitoring of illness and injury in elite athletes

Research on sports injury prevention was previously mainly observational studies outlining injury risk in various sports, their incidence, pattern, and severity. However, few studies had been designed to provide in-depth information on injury mechanisms and risk factors – information needed in order to propose relevant preventive measures. Based on this background, the Oslo Sports Trauma Research Center was established in May 2000 - as a joint venture between Oslo University Hospital and the Norwegian School of Sport Sciences.

In 2009, the Oslo Sports Trauma Research Center was inaugurated as a FIFA Medical Center of Excellence. The same year the center was also selected as one of the four inaugural IOC Research Centers for Prevention of Injury and Protection of Athlete Health, now counting eleven such centers around the world. [1] Additionally after this research was published there is an organization that see this beneficial paper quite useful to be based reference for their research which this research is about modifying the OSTRC questionnaires report, OSTRC believe that these changes will provide a better experience for the respondents and, in turn, maximize their adherence

These perceptions are dependent on contextual factors such as athlete experience, level of sports, type of sport, and time of the season. This means that data collected from different cohorts of athletes will not necessarily be comparable. We encourage further research to explore the psychometric properties of the OSTRC questionnaires across different contexts and populations. [2]

Users from a range of sports research and clinical environments have gained experience using the OSTRC questionnaires and have identified areas in which they could be improved. In this paper, to provide greater clarity and consistency of questioning, present changes to the wording, structure, and logic of the original

OSTRC questionnaires. We believe that these changes will improve athletes' experience when completing the questionnaires and improve the quality of collected data. [3]

2.1.2 Psychological Readiness of Athletes to Return to Play Following Injury

This research was to gather the statistics of each athlete from every field in terms of the mind state of returning to play.

Descriptive statistics (means and standard deviations) were calculated for all demographic and study variables. Student-athletes were classified into two groups, Ready or Not Ready, based on their perceived psychological readiness to return to play via IPRS scores. All student-athletes who scored highly confident with an I-PRRS score greater than or equal to 50 were classified as Ready (I-PRRS > 50).
8 All student-athletes who scored below highly confident with an I-PRRS score less than 50 were classified as Not Ready (I-PRRS < 50). [4]

- Sleep Quality

The Sleep Quality research is research that has information conducted on the use of group processes to solve sleep problems in the elder people with the objective of studying the situation of insomnia in the elder people the target group was 11 elder people with poor sleep quality. participate in group activities Processing time 8 weeks, collecting general information. Sleep Quality Assessment and a daily sleep record.

Sleep is an essential process for life maintenance, facilitating biological restoration as well as mind and body attunement. Poor sleep quality may have a negative effect on daily activities, such as impaired work and study performance, accidents, and problems with social interaction. Nevertheless, an increasing number of patients suffer from sleeping disorders and seek medical treatment, therefore. Clinical evaluation and follow-up assessments require a specific tool that cannot only evaluate several aspects of sleep problems to detect patients with sleep disorders early but also produce relatively stable results over time. [5]

CHAPTER 3

ANALYSIS AND DESIGN

3.1 System Architecture Overview

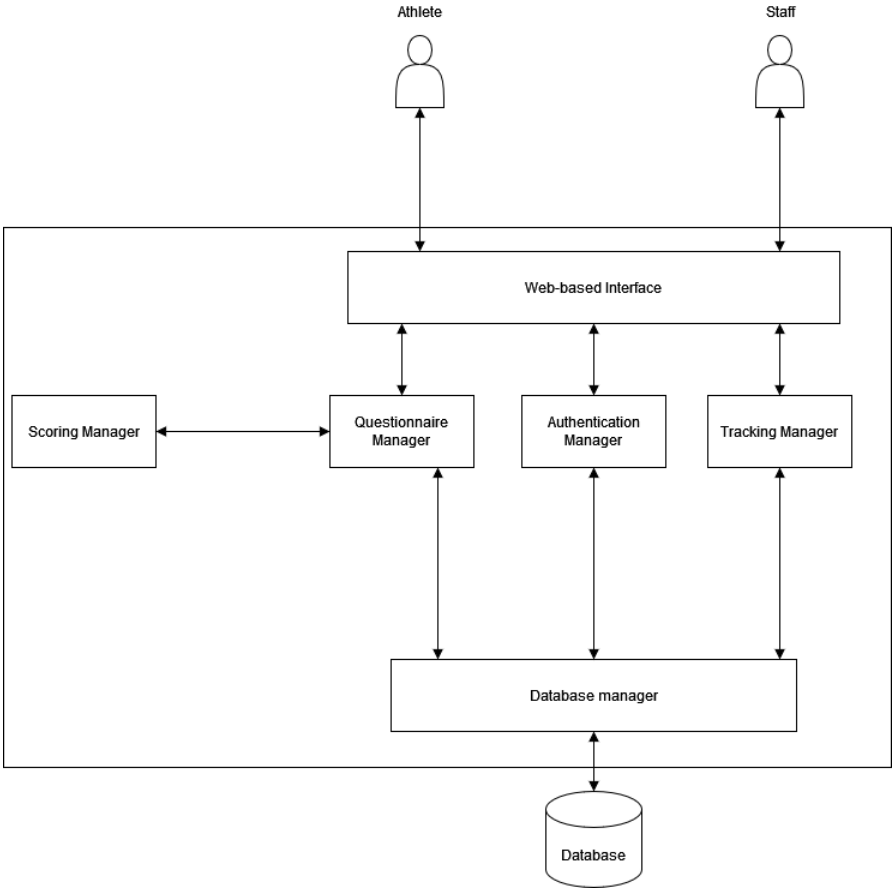


Figure 3.1: System architecture diagram

Figure 3.1 shows the overview architecture of the Sports Injury and Illness Assessment and Tracking System (SIATS). There are two types of target users, Athletes, and Medical Teams, where athletes can fill out weekly questionnaires and store them in a database and track their data to let them know they are ready to train or compete. The medical team can track individual athletes' data to provide feedback to the athletes and plan training sessions or treatments directly to athletes without going through our application. The system consists of a web-based interface, the questionnaire manager, the authentication manager, the scoring manager, the tracking manager, and the database manager. The web-based interface can be used by users across multiple platforms, whether via a mobile device is IOS or Android and a

computer or laptop is the operating system Windows. The authentication manager is there to manage the user's account. It can be separated into two categories: athletes and medical teams, where athletes have permission to save and read their data. The medical teams can customize roles from athletes to the medical team if there are new medical teams and can read the data of each athlete. The Questionnaire Manager will have requests from athletes coming through the web-based interface to access each type of questionnaire. The Questionnaire Manager will send the result to Scoring Manager to calculate the score according to the Oslo Sports Trauma Research Center (OSTRC) and return the score to the Questionnaire Manager to send to the Database Manager to store in the database. The tracking manager will have requests from users coming through the web-based interface to access athlete information. The database manager acts as an intermediary to connect to the database by receive queries from each function and return it back to each function. The database system is divided into three main parts: the user's database, each type of questionnaire's database, and the result's database.

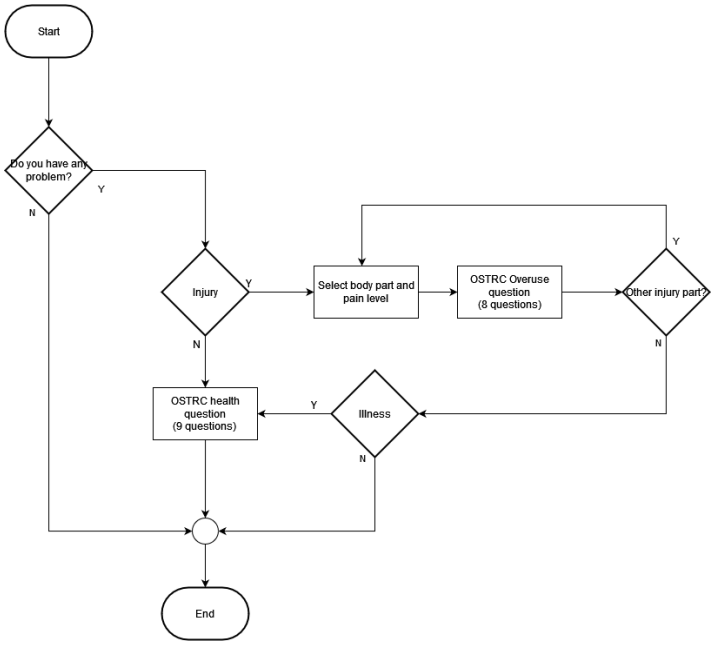


Figure 3.2: Flow diagram of Health & Overuse

Based on Figure 3.1 The Questionnaire Manager questionnaires are divided into two parts, Physical and Mental problem, where Figure 3.2 is Health and Overuse questionnaires are in Physical problems. It is divided into illness that will belong to

Health questionnaires and injury will be overuse questionnaires. It will start with the first question of whether the athlete has a problem or not. If the athlete answers "No", it will end this flow immediately, but if the athlete answers "Yes", it will ask the athlete again if there is an injury problem or not. If the athlete answers "No", it will go to the illness questionnaires immediately, but if the athlete answers "Yes", it will start from the selection of the injured athlete's body part after that will be asked about the 8 the Oslo Sports Trauma Research Center (OSTRC) questionnaires and after the athlete answers the question, The system will ask athlete if there are any other injury problems or not. If the athlete answers "Yes" It will back to the selection of the injured body part. But if the athlete answers "No", it will ask if the athlete had any illness and if the athlete answers "No", the flow would end immediately. But if the athlete answers "Yes", the athlete will go to 9 OSTRC questionnaires and if the athlete finishes the question, the flow will end immediately.

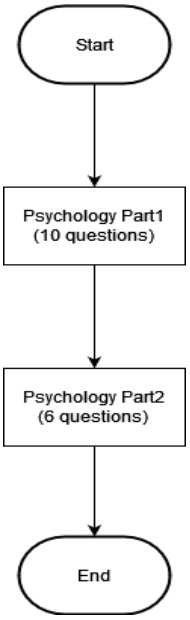
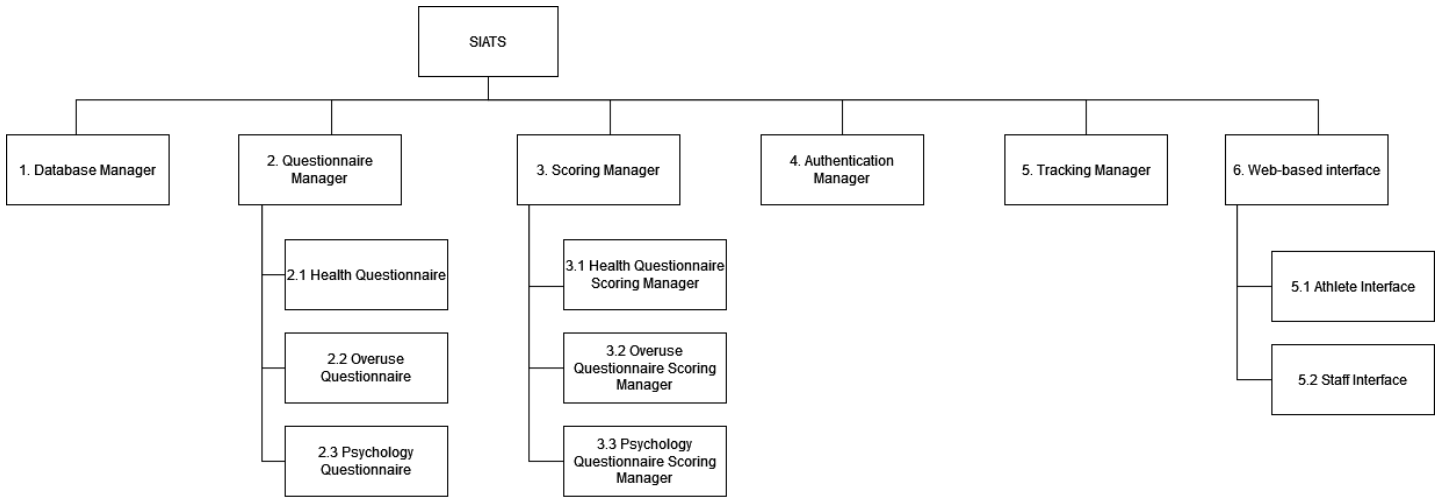


Figure 3.3: Flow diagram of Psychology

In Figure 3.3 shows the system flow diagram of Psychology illustrates the workflow. In this flow, there are two questions, Psychology Part1, and Psychology Part2. By starting from the athlete pressed into the psychology questionnaires. Starting with the psychology part1 where there are 10 questionnaires and after answering the question will go to the psychology part2 immediately and if the answer is completed, it will end the flow immediately.

3.2 System Structure Chart



Project : A Sport Injury and Illness Assessment and Tracking System **System :** Assessment and Tracking System	**Major Advisor :** ASST. PROF. DR. CHARNYOTE PLUEMPITIWIRIYAWEJ
Description : In the system structure chart, our project has 6 main processes which are Database Manager, Questionnaire Manager, Scoring Manager, Authentication Manager, Tracking Manager, and Web-based Interface.	

Figure 3.4: SIATS Structure Chart

The detailed description of each subsystem is shown below:

1. Database Manager

Acts as an intermediary for sending and receiving data between the application and the database.

2. Questionnaire Manager

2.1. Health Questionnaire

The health questionnaire was in the physical category. There will be 9 questions for athletes to do.

2.2. Overuse Questionnaire

The overuse questionnaire was in the physical category same as the health questionnaire. There will be 8 questions for athletes to do.

2.3. Psychology Questionnaire

The psychology questionnaire was in the mental category. There will be separate in 2 sections. In section one has 10 questions and section two has 6 questions.

3. Scoring Manager

3.1. Health Questionnaire Scoring Manager

Acts as a calculating question in the Health Questionnaire section, and after that, both uncomputed and completed data are sent to the Database Manager to import into the database.

3.2. Overuse Questionnaire Scoring Manager

Acts as a calculating question in the Overuse Questionnaire section, and after that, both uncomputed and completed data are sent to the Database Manager to import into the database.

3.3. Psychology Questionnaire Scoring Manager

Acts as a calculating question in the Psychology Questionnaire section, and after that, both uncomputed and completed data are sent to the Database Manager to import into the database.

4. Authentication Manager

Acts as a manage the user's account. It is separated into two categories: athletes and medical teams, where athletes have permission to save and read their data. The medical teams can customize roles from athletes to the medical team if there are additional medical teams and can read the information of each athlete.

5. Tracking Manager

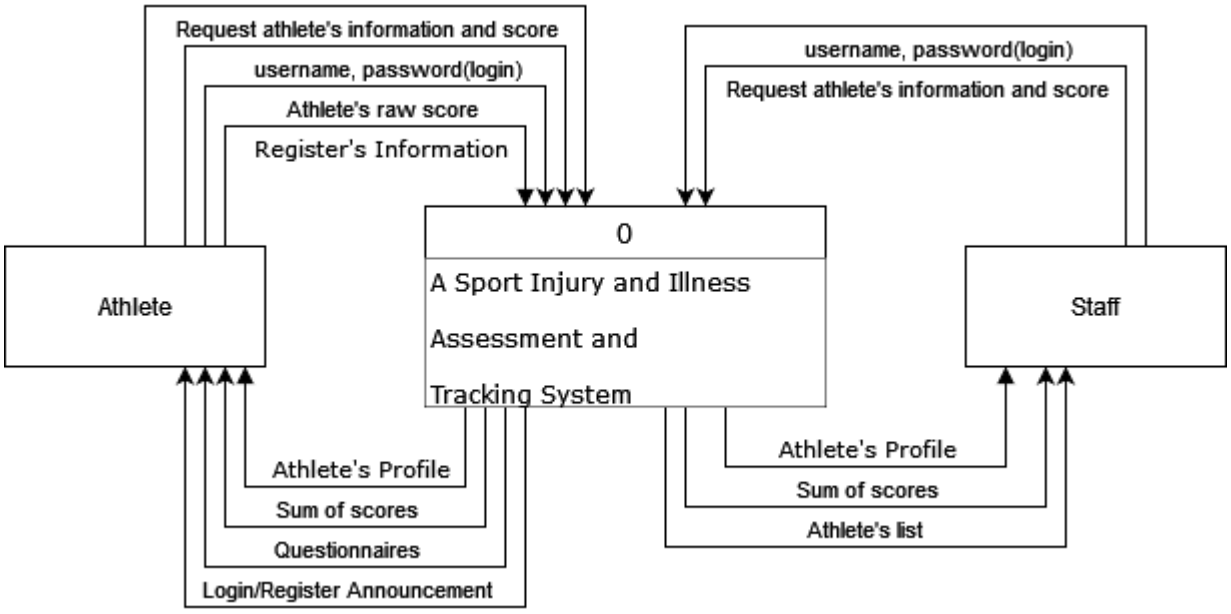
Used as an intermediary between the interface and the web-based interface to choose to display scores or personal information of athletes.

6. Web-based Interface

Serves as displaying personal information or scores of athletes for athletes and staff. It is divided into interfaces for athletes and staffs.

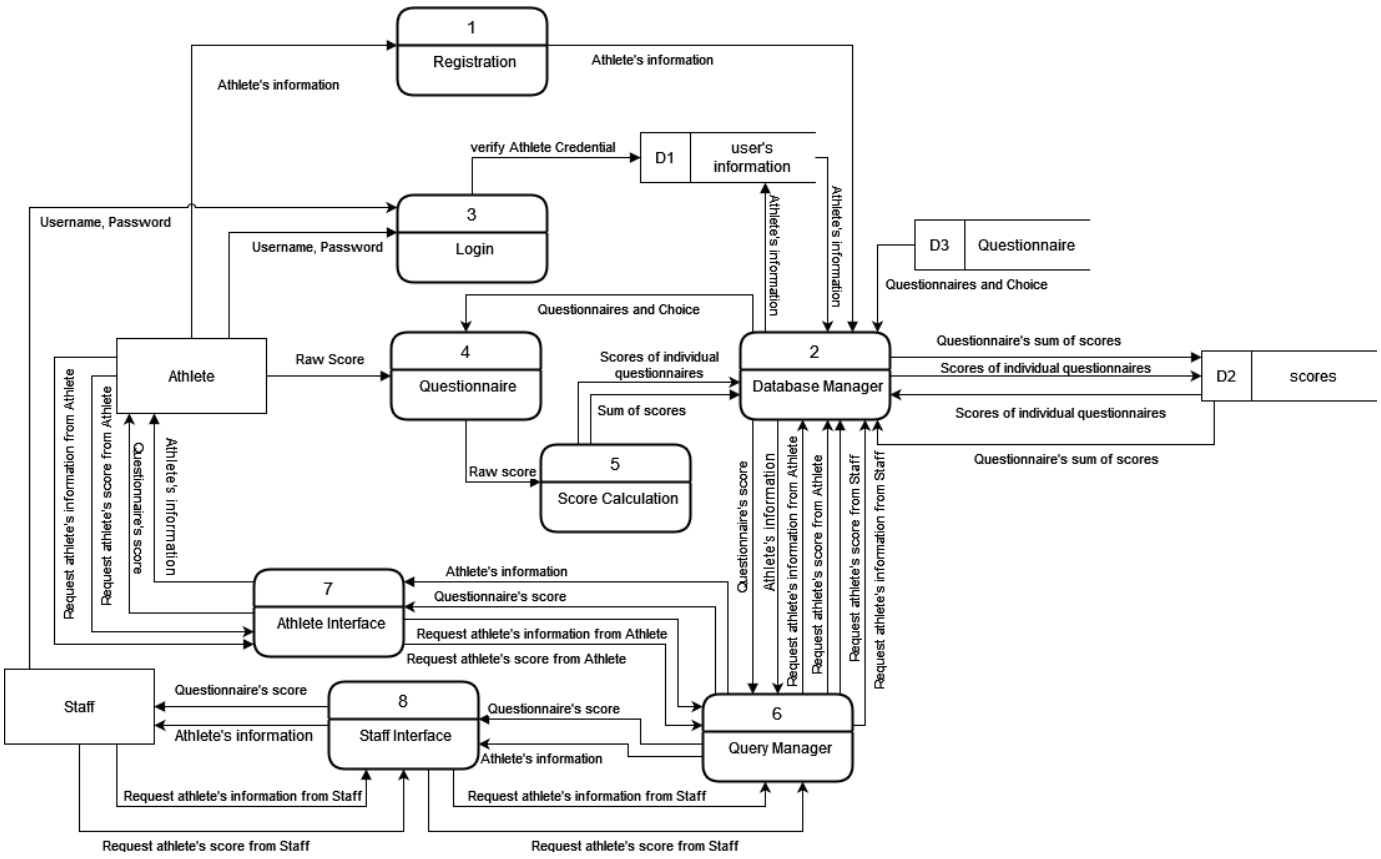
3.3 Process Analysis and Design

3.3.1 Data Flow Diagram



Project : A Sport Injury and Illness Assessment and Tracking System **System :** Assessment and Tracking System	**Major Advisor :** ASST. PROF. DR. CHARNYOTE PLUEMPITIWIRIYAWEJ
Description : This diagram illustrates how Athlete and its staff interact with the system and how the data flows.	

Figure 3.5: SIATS Data Flow Diagram Level 0



Project : A Sport Injury and Illness Assessment and Tracking System **System :** Assessment and Tracking System	**Major Advisor :** ASST. PROF. DR. CHARNYOTE PLUEMPITIWIRIYAWEJ
Description : This diagram shows how athletes and staff interact with the system in 8 categories: Registration, Login, Questionnaires, Database Manager, Score Calculation, Query Manager, Athlete Interface, and Staff Interface.	

Figure 3.6: SIATS Data Flow Diagram Level 1

3.3.2 Data Dictionary

A data dictionary is a way to document and describe Processes, Data Stores, and Data Elements (Data Flow) that occur in a Data Flow Diagram (DFD). It is composed of 3 parts as shown below.

- Process Descriptions
- Data Stores
- Data Elements

3.3.2.1 Process Description

This section will provide the detailed description of each process that exists in this system. It includes Inbound Data, Outbound Data, and Logic Summary.

Table 3.1: List of all Processes

No.	Process	Name	Description
1	1	Registration	The function used to collect personal information of athletes.
2	2	Database Manager	Acts as an intermediary between the system and the database.
3	3	Login	Login function used to verify the user's username and password before logging in.
4	4	Questionnaire	A function that is used to receive answers from athletes to answer questions.
5	5	Score calculation	To calculate the raw score sent from the questionnaire function.
6	6	Query Manager	Used as an intermediary between the interface and athlete or staff to send the scores or personal information of athletes to Athlete or Staff Interface.
7	7	Athlete Interface	Serves as displaying personal information or scores of athletes to athletes.

8	8	Staff Interface	Serves as displaying personal information or scores of athletes to staffs.

Table 3.2: Process Description of Registration

Process Name	Registration
Description	The functions used to collect personal information of athletes.
Outbound Data	• Athlete's information
Logic Summary	No subsystem

Table 3.3: Process Description of Database Manager

Process Name	Database Manager
Description	Acts as an intermediary between the system and the database.
Inbound data	• Call data from Database • Receive score • Accessed from Staff • Receive message
Outbound Data	• Store data to Database • Sent score to Score Calculator
Logic Summary	No subsystem

Table 3.4: Process Description of Login

Process Name	Login
Description	Login function used to verify the user's username and password before logging in.
Outbound Data	• Username and password
Logic Summary	No subsystem

Table 3.5: Process Description of Questionnaires

Process Name	Questionnaires
Description	A function that is used to receive answers from athletes to answer questions. There are 3 types of questionnaires which are "Health", "Overuse", and "Psychology".
Inbound data	● The score from each questionnaire
Outbound Data	● Sent score to Database Manager
Logic Summary	No subsystem

Table 3.6: Process Description of Score Calculation

Process Name	Score Calculation
Description	It serves to calculate the scores that athletes have completed the questionnaires, and each type of questionnaire has its own score calculator.
Inbound data	● Receive score
Outbound Data	● Sent the score
Logic Summary	No subsystem

Table 3.7: Process Description of Query Manager

Process Name	Query Manager
Description	Used as an intermediary between the interface and athlete or staff to send the scores or personal information of athletes to Athlete or Staff Interface.
Inbound data	● Receive the select query from Athlete ● Receive the select query from Staff
Outbound Data	● Sent request information from athlete ● Sent request information from staff
Logic Summary	No subsystem

Table 3.8: Process Description of Athlete interface

Process Name	Athlete interface
Description	Serves as displaying personal information or scores of athletes to athletes.
Inbound data	● Questionnaire's score ● Athlete's information
Outbound Data	● Show questionnaire's score ● Show athlete's information
Logic Summary	No subsystem

Table 3.9: Process Description of Staff interface

Process Name	Staff interface
Description	Serves as displaying personal information or scores of athletes to staffs.
Inbound data	● Questionnaire's score ● Athlete's information
Outbound Data	● Show questionnaire's score ● Show athlete's information
Logic Summary	No subsystem

3.3.2.2 Data Stores

This section describes the data stores that exist in the data flow diagram and consists of the Data Store Name, Description, Inbound Data, and Outbound Data.

Table 3.10: List of all Data Stores

No.	Data Store	Name	Description
1	1	User's information	It serves to store all the data, whether it is the personal data of the athletes and staffs.
2	2	score	It serves to store the scores obtained by the athletes from questionnaires.
3	3	Questionnaires	It serves to store the questionnaires and choice.

Table 3.11: Data Store Description of Database

Data Store Name	user's information
Description	It serves to store all the data, whether it is the personal data of the athletes and staffs.
Inbound data	● Receive athlete's information, athlete's username password and staff username password via Database Manager to other function.
Outbound Data	● Send athlete's information via Database Manager to other function.

Data Store Name	score
Description	It serves to store the scores obtained by the athletes from questionnaires.
Inbound data	● Receive athlete's score via Database Manager to other function.

Outbound Data	● Send athlete's score via Database Manager to other function.

Data Store Name	Questionnaire
Description	It serves to store the scores obtained by the athletes from questionnaires.
Outbound Data	● Send questionnaires and choices via Database Manager to Questionnaire function.

3.3.2.3 Data Element

This section describes the data elements or data flows that exist in this system. The table below contains the list of all data elements belonging to their data element name, starting process/source/data store, and ending process/source/data store.

Table 3.12: List of All Data Elements

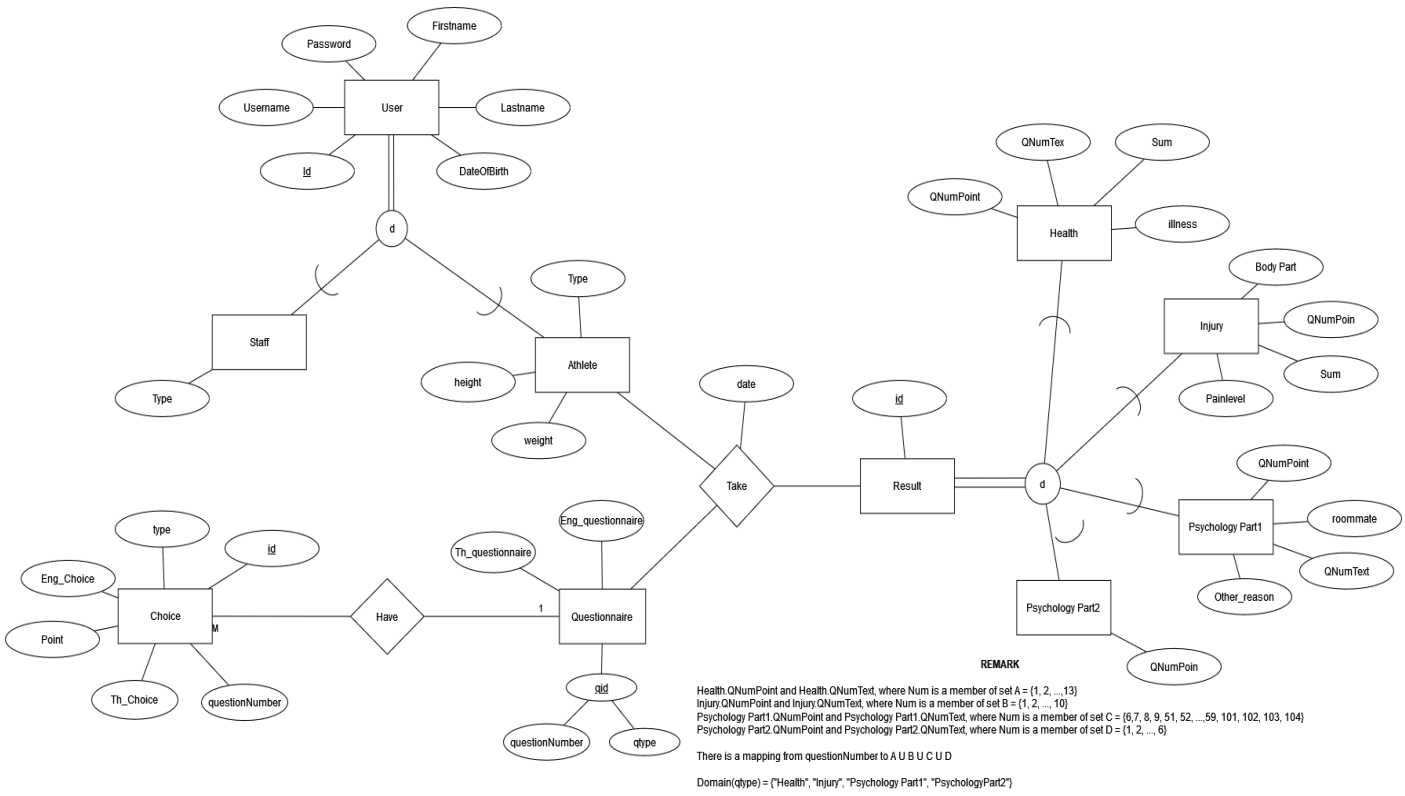
SEQ	Data Element Name	From Process/Source/Data Store	To Process/Source/Data Store
1	Athlete's information	Athlete	Process-1 Registration
2	Athlete's information	Process-1 Registration	Process-2 Database Manager
3	Athlete's information	Process-2 Database Manager	Database-1 User's information
4	Username, password	Athlete	Process 3 Login
5	Verify athlete credential	Process 3 Login	Database-1 User's information
6	Questionnaires and Choice	Database-3 Questionnaire	Process 2 Database Manager
7	Questionnaires and Choice	Process 2 Database Manager	Process 4 Questionnaires
8	Username, password	Process 3 Login	Database-1 User's information
9	Raw score	Athlete	Process 4 Questionnaires
10	Raw score	Process 4 Take Questionnaires	Process 4 Score calculation
11	Sum of score	Process 5 Score calculation	Process 2 Database Manager
12	Scores of individual questionnaires	Process 5 Score calculation	Process 2 Database Manager
13	Score of individual questionnaires	Process 2 Database Manager	Database-2 Athlete's score collector
14	Questionnaire's sum of score	Process 2 Database Manager	Database-2 Athlete's score collector
15	Score of individual questionnaires	Database-2 Athlete's score collector	Process 2 Database Manager
16	Questionnaire's sum of score	Database-2 Athlete's score collector	Process 2 Database Manager

17	Request information from Athlete	Athlete	Process 7 Athlete Interface
18	Request score's information from Athlete	Athlete	Process 7 Athlete Interface
19	Request athlete's information from Staff	Staff	Process 8 Staff Interface
20	Request score's score from Staff	Staff	Process 8 Staff Interface
21	Request information from Athlete	Process 7 Athlete Interface	Process 6 Query Manager
22	Request score's information from Athlete	Process 7 Athlete Interface	Process 6 Query Manager
23	Request athlete's information from Staff	Process 8 Staff Interface	Process 6 Query Manager
24	Request score's score from Staff	Process 8 Staff Interface	Process 6 Query Manager
25	Request information from Athlete	Process 6 Query Manager	Process 2 Database Manager
26	Request score's information from Athlete	Process 6 Query Manager	Process 2 Database Manager
27	Request athlete's information from Staff	Process 6 Query Manager	Process 2 Database Manager
28	Request score's score from Staff	Process 6 Query Manager	Process 2 Database Manager
29	Questionnaire’s score	Process 2 Database Manager	Process 6 Query Manager
30	Athlete’s information	Process 2 Database Manager	Process 6 Query Manager
31	Questionnaire’s score	Process 6 Query Manager	Process 8 Athlete Interface
32	Athlete’s information	Process 6 Query Manager	Process 8 Athlete Interface
33	Questionnaire’s score	Process 6 Query Manager	Process 9 Staff Interface
34	Athlete’s information	Process 6 Query Manager	Process 9 Staff Interface
35	Questionnaire’s score	Process 8 Athlete Interface	Athlete

36	Athlete’s information	Process 8 Athlete Interface	Athlete
37	Questionnaire’s score	Process 9 Staff Interface	Staff
38	Athlete’s information	Process 9 Staff Interface	Staff

3.4 Database Analysis and Design

3.4.1 ER-Diagram



Project : A Sport Injury and Illness Assessment and Tracking System **System :** Assessment and Tracking System	**Major Advisor :** ASST. PROF. DR. CHARNYOTE PLUEMPITIWIRIYAWEJ
Description : ER-Diagram of SIATS includes 6 entities which are questionnaires, choice, superclass users includes 2 subclasses which are Athlete, Staff, and superclass Questionnaires includes 3 subclasses which are Overuse, Psychology, and Health.	

Figure 3.7: Conceptual ER-Diagram of SIATS

3.4.2 Relational Schema

This section describes the attributes of the tables in the database. The attribute notation is shown below.

- **Attributes** – which are bold and underlined are the Primary Keys
- *Attributes* – which are Italic are the Foreign Keys
- ***Attributes*** – which are bold, italic, and underlined are both Primary Keys and Foreign Keys

Tables in this system can be divided into 3 groups as follows:

- User File Table
- Questionnaires File Table
- Scores File Table

Table 3.13: List of all Tables in Our System Database

Table#	Table Name	Table Type	Description
1.	Athlete	varchar	This table is subclass that will stores the information of the athlete.
2.	Staff	varchar	This table is subclass that will stores the information of the staff.
3.	Questionnaire	varchar	This table stores all the questionnaire.
4.	Choice	varchar	This table stores all the choice.
5.	athscore	varchar	This table is subclass that will stores score those athletes do about Health questionnaires.
6.	Injury	varchar	This table is subclass that will stores score those athletes do about Overuse questionnaires.
7.	psychology	varchar	This table is subclass that will stores score those athletes do about Psychology questionnaires.
8.	Psychology Part2	varchar	This table is subclass that will stores score those athletes do about Psychology questionnaires.

Relational Schema Files Table

1. Relational Schema of User File Tables

Athlete (id, username, password, registered, firstname, lastname, dateofbirth, lastlogin, Type, weight, height)

Staff (id, username, password, registered, firstname, lastname, dateofbirth, lastlogin, Type)

2. Relational Schema of Questionnaires File Tables

Questionnaire (questionNumber, qtype, Th_qtext, Eng_qtext)

Choice (id, part, point, Th_text, Eng_text, QuestionNumber)

3. Relational Schema of Scores File Tables

Athscore (id, *Athlete.user_id*, Sum, h1_point, h2_point, h3_point, h4_point, h8_text, h9_text, h10_text, h12_text, h11_name, h11_workplace, h12_point, h13_point, other, misstraining, additional, illness, submit_date)

Injury (id, *Athlete.user_id*, bodypart, Sum, q1_ans, q2_ans, q3_ans, q4_ans, painlevel, name, workplace, reported_problem, misstraining, additional, First_time, date)

Psychology (id, *Athlete.user_id*, Fall_sleep_long, Hours_actual_sleep, 51_point, 52_point, …,59_point, Other_reason, 6_point, 7_point, 8_point, 9_point, roommate, 101_text, 102_text, 103_text, 104_text, Other_restlessness, Component1, Component2, …, Component7, date)

Psychologypart2 (id, *Athlete.user_id*, 1_point, 2_point, …, 6_point, date)

3.4.3 File Structure

Table 3.14: File Structure of Athlete

Table Name: **Athlete**						**Table#1**
Table Type : User						
Description : Recording the personal information of the athletes.						
Field Name	**Type**	**Length**	**Description**	**Key**	**Reference**	**Null**
id	int	11	Athlete’s id	PK		Not
username	varchar	500	Athlete’s username			Not
password	varchar	100	Athlete’s password			Not
Firstname	varchar	500	Athlete’s firstname			Not
Lastname	varchar	500	Athlete’s lastname			Not
dateofbirth	DATE	6	Date of birth			Not
height	int	11	Athlete’s height			Not
Weight	int	11	Athlete’s weight			Not

Type	varchar	500	Athlete’s type			Not
registered	varchar	100	Athlete’s registered day			Not
Last_login	DATETIME	14	Athlete’s last login day			Not
	Total	2,253	Bytes			

Table 3.15: File Structure of Staff

Table Name: Staff						**Table#1**
Table Type :						
Description : Recording the personal information of the staff.						
Field Name	**Type**	**Length**	**Description**	**Key**	**Reference**	**Null**
id	int	11	Staff's id	PK		Not
username	varchar	500	Staff's username			Not
password	varchar	100	Staff's password			Not
Firstname	varchar	500	Staff's firstname			Not
Lastname	varchar	500	Staff's lastname			Not
dateofbirth	DATE	6	Date of birth			Not
Type	varchar	500	Staff's type			Not
registered	varchar	100	Staff's registered day			Not
Last_login	DATETIME	14	Staff's last login day			Not
	Total	2,231	Bytes			

Table 3.16: File Structure of Questionnaires

Table Name :	Questionnaires					**Table#3**
Table Type :	Questionnaires					
Description :	Recording the questionnaires.					
Field Name	**Type**	**Length**	**Description**	**Key**	**Reference**	**Null**
questionNumber	int	11	Questionnaires' number	PK		Not
qtype	varchar	100	Questionnaires' type	PK		Not
Th_qtext	varchar	500	Questionnaires' Thai text			Not
Eng_qtext	varchar	500	Questionnaires' English text			Not
	Total	1111	Bytes			

Table 3.17: File Structure of Choice

Table Name :	Choice					**Table#4**
Table Type :	Questionnaires					
Description :	Recording the choice.					
Field Name	**Type**	**Length**	**Description**	**Key**	**Reference**	**Null**
id	int	100	Choice's id	PK		Not
Type	varchar	100	Choice's type			Not
point	int	100	Choice's point			Not
questionNumber	int	11	Questionnaires' number			Not
Th_text	varchar	500	Choice's Thai text			Not
Eng_text	varchar	500	Choice's English text			Not
	Total	1311	Bytes			

Table 3.18: File Structure of athscore

Table Name :	Athscore					**Table#5**
Table Type :	Score					
Description :	Recording the score that athletes take in Health questionnaire.					
Field Name	**Type**	**Length**	**Description**	**Key**	**Reference**	**Null**
id	int	11	Health questionnaire's id	PK		Not
user_id	int	11	Athlete's id	FK	Athlete	Not
Sum	int	11	Health questionnaire's sum point.			Not
h1_point	int	11	Health questionnaire's point of questionnaire number 1.			Not
h2_point	int	11	Health questionnaire's point of questionnaire number 2.			Not
h3_point	int	11	Health questionnaire's point of questionnaire number 3.			Not
h4_point	int	11	Health questionnaire's point of questionnaire number 4.			Not
h8_text	int	11	Health questionnaire's text of questionnaire number 8.			Not

h9_text	int	11	Health questionnaire's text of questionnaire number 9.			Not
h10_text	int	11	Health questionnaire's text of questionnaire number 10.			Not
h12_text	int	11	Health questionnaire's text of questionnaire number 12.			Not
h11_name	varchar	500	The name of the doctor that athlete was treated.			Not
h11_workplace	varchar	500	The name of the workplace of doctor that athlete was treated.			Not
h12_point	int	11	Health questionnaire's point of questionnaire number 12.			Not
h13_point	int	11	Health questionnaire's point of questionnaire number 13.			Not
other	int	11	The other health problem.			Not
misstraining	int	11	The day that athlete miss-training.			Not
additional	varchar	500	The additional information for staff.			Not
illness	varchar	500	The athlete's illness.			Not
Submit_date	DATETIME	14	The day that athlete take the questionnaire in Health part.			Not
	Total	2176	Bytes			

Table 3.19: File Structure of injury

Table Name : injury						**Table#5**
Table Type : Score						
Description : Recording the score that athletes take in Overuse questionnaire.						
Field Name	**Type**	**Length**	**Description**	**Key**	**Reference**	**Null**
id	int	11	Overuse questionnaire's id	PK		Not
user_id	int	11	Athlete's id	FK	Athlete	Not
bodypart	varchar	100	The body part that athlete injured.			Not
painlevel	int	11	The level of injury.			Not
Sum	int	11	Overuse questionnaire's sum point			Not
q1_ans	int	11	Overuse questionnaire's point of questionnaire number 1			Not
q2_ans	int	11	Overuse questionnaire's point of questionnaire number 2			Not

q3_ans	int	11	Overuse questionnaire's point of questionnaire number 3			Not
q4_ans	int	11	Overuse questionnaire's point of questionnaire number 4			Not
First_time	varchar	500	Overuse questionnaire's text			Not
name	varchar	500	The name of the doctor that athlete was treated.			Not
workplace	varchar	500	The name of the workplace of doctor that athlete was treated.			Not
reported_problem	varchar	500	Type of medical team in which athletes are treated			Not
misstraining	int	11	The day that athlete miss-training.			Not
additional	varchar	500	The additional information for staff.			
date	DATETIME	14	The day that athlete take the questionnaire in Injury part.			Not

Total	2713	Bytes

Table 3.20: File Structure of Psychology

Table Name :	Psychology					**Table#5**
Table Type :	Score					
Description :	Recording the score that athletes take in Psychology questionnaire.					
Field Name	**Type**	**Length**	**Description**	**Key**	**Reference**	**Null**
id	int	11	Psychology's id	PK		Not
user_id	int	11	Athlete's id	FK	Athlete	Not
51_point	int	11	Psychology's point of questionnaire number 51.			Not
52_point	int	11	Psychology's point of questionnaire number 52.			Not
53_point	int	11	Psychology's point of questionnaire number 53.			Not
54_point	int	11	Psychology's point of questionnaire number 54.			Not
55_point	int	11	Psychology's point of questionnaire number 55.			Not

56_point	int	11	Psychology's point of questionnaire number 56.			Not
57_point	int	11	Psychology's point of questionnaire number 57.			Not
58_point	int	11	Psychology's point of questionnaire number 58.			Not
59_point	int	11	Psychology's point of questionnaire number 59.			Not
101_text	varchar	500	Psychology's text of questionnaire number 101.			Not
102_text	varchar	500	Psychology's text of questionnaire number 102.			Not
103_text	varchar	500	Psychology's text of questionnaire number 103.			Not
104_text	varchar	500	Psychology's text of questionnaire number 104.			Not
Other_reason	varchar	500	Other reason that disturbs while athlete sleeping.			
6_point	int	11	Psychology's point of questionnaire number 6.			Not
7_point	int	11	Psychology's point of questionnaire number 7.			Not
8_point	int	11	Psychology's point of questionnaire number 8.			Not
9_point	int	11	Psychology's point of questionnaire number 9.			Not

Fall_sleep_long	int	11	How many minutes does it take athletes to sleep?			Not
Hours_actual_sleep	int	11	The amount of time the athlete can actually sleeps.			Not
Roommate	varchar	500	The name of roommate.			Not
componentNo.	int	11	The calculated score that taken from athletes			Not
Other_restlessness	varchar	500	The reason that athlete disturb athlete's roommate while sleeping.			Not
Date	DATE TIME	14	The day that athlete take the questionnaire in Psychology part.			Not
	Total	3712	Bytes			

Table 3.21: File Structure of Psychologypart2

Table Name :	**Psychologypart2**					**Table# 8**
Description :	Recording the score that athletes take in Psychology questionnaire.					
Field Name	**Type**	**Length**	**Description**	**Key**	**Reference**	**Null**
id	int	11	Psychologypart2's id	PK		Not
user_id	int	11	Athlete's id	FK	Athlete	Not
1_point	int	11	Psychologypart2's point of questionnaire number 1.			Not
2_point	int	11	Psychologypart2's point of questionnaire number 2.			Not

3_point	int	11	Psychologypart2’s point of questionnaire number 3.			Not
4_point	int	11	Psychologypart2’s point of questionnaire number 4.			Not
5_point	int	11	Psychologypart2’s point of questionnaire number 5.			Not
6_point	int	11	Psychologypart2’s point of questionnaire number 6.			Not
date	DATETIME	14	The day that athlete take the questionnaire in psychology part2.			Not
Total		102	Bytes			

3.5 I/O Design

This section explains the design of the Input and Output User Interface. Explain how it works and what it will show.

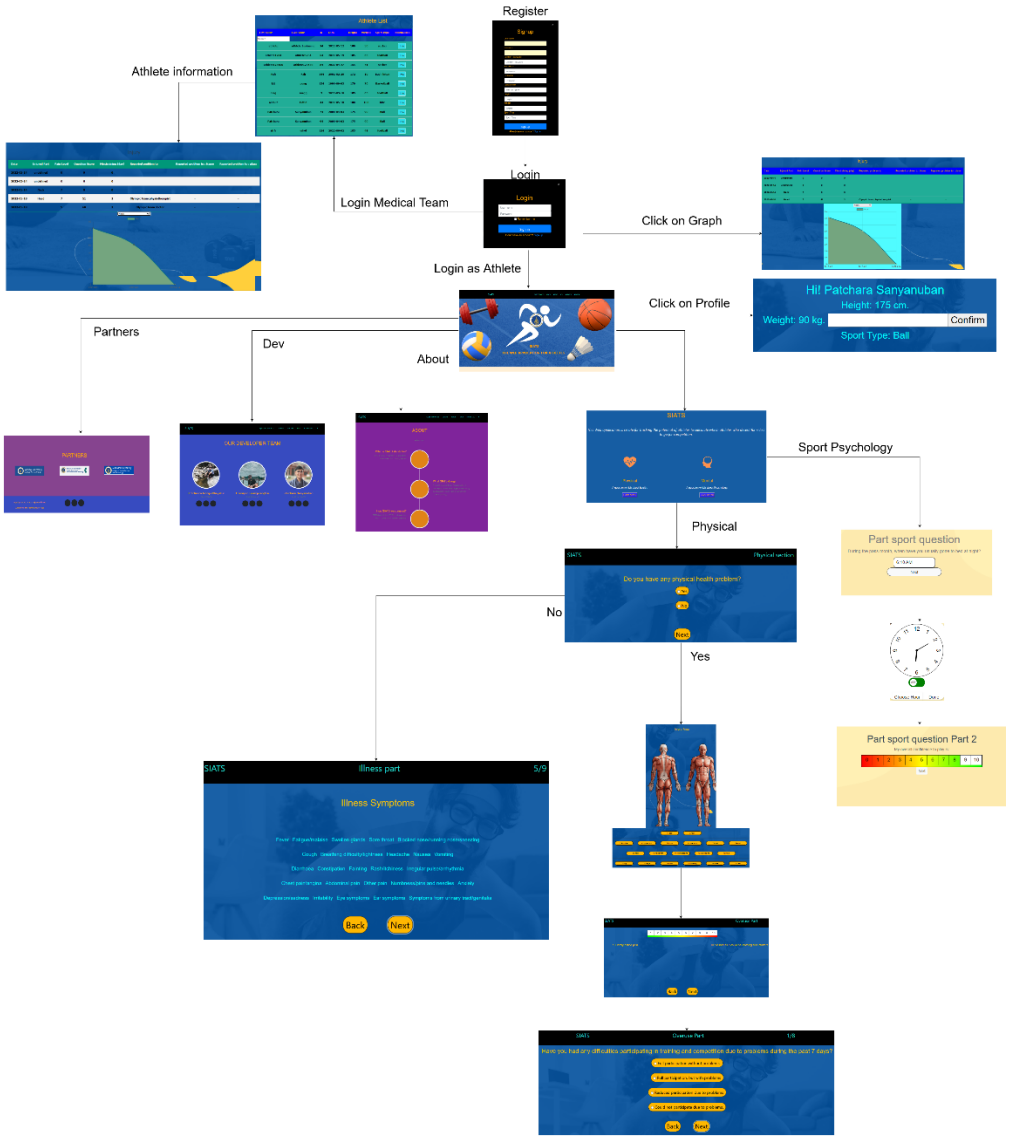


Figure 3.8: Linked Pages

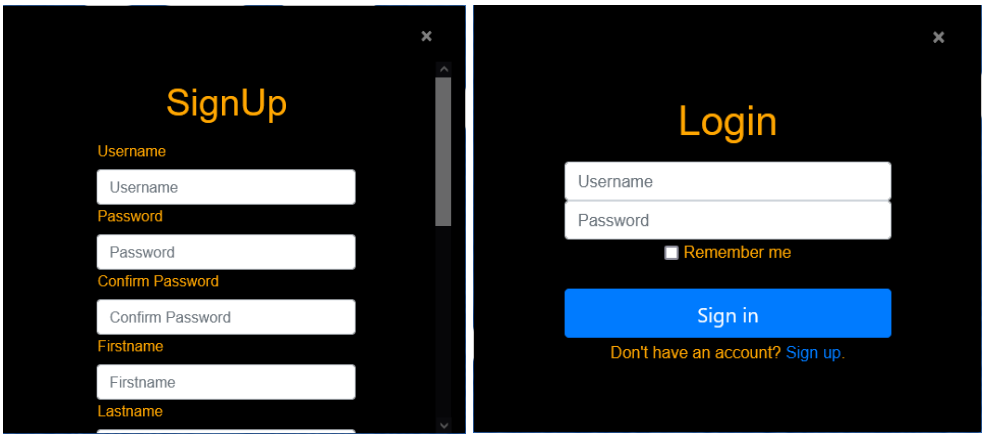


Figure 3.9: Register/Login

In Figure 3.9. Users need to sign up via put information to create an ID for login to have an access for use the web application.

Figure 3.10: Home Page

In Figure 3.10 Homepage contains 7 main parts. The first part is the navigation bar. With the navigation bar, can link into 7 parts which are Questionnaires, Graph, About, Dev, Partners, and Users Profile.

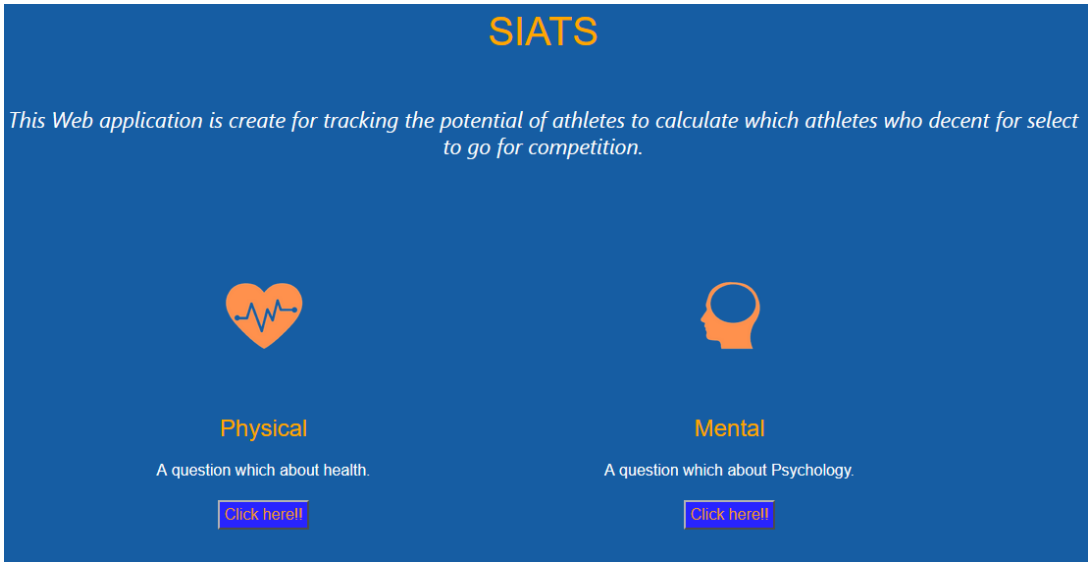


Figure 3.11: Questionnaires

In Figure 3.11 When you click on the “Questionnaires” on the top right navigation bar it will slide down to the Questionnaires part which include Physical and Sport Psychology questions.

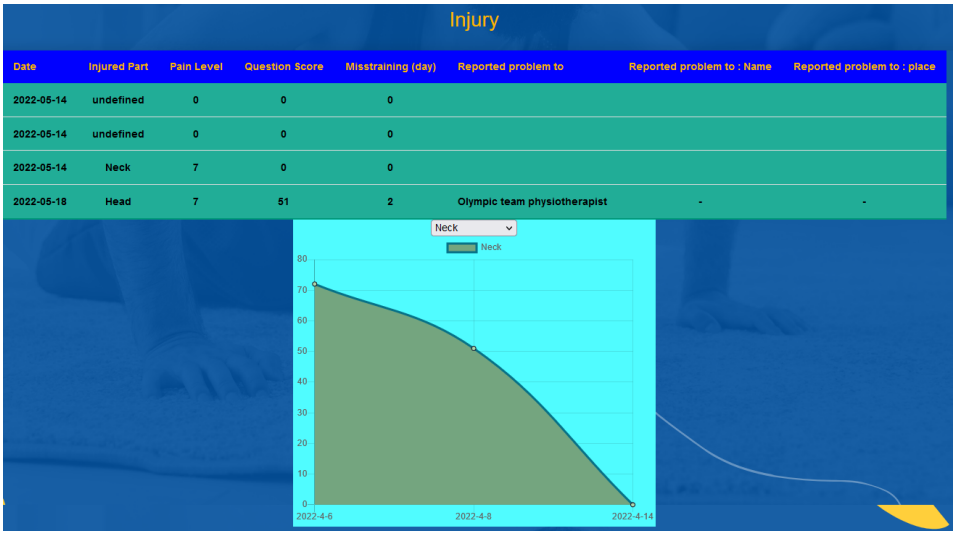


Figure 3.12: Graph

In Figure 3.12 when you click the “Graph” on the nav bar it will open the new screen to show the score and date as a graph. On the first graph it will show the score for Part that you select to do and for the second graph it will show the part that you injure.

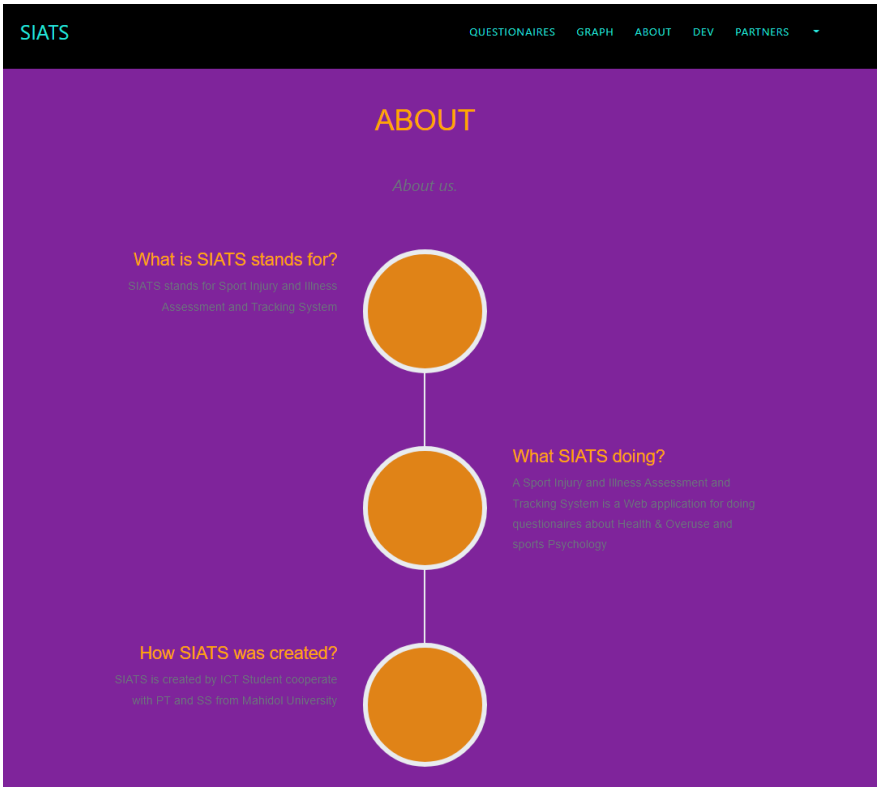


Figure 3.13: About

In Figure 3.13 it will show the details what SIATS doing, creating

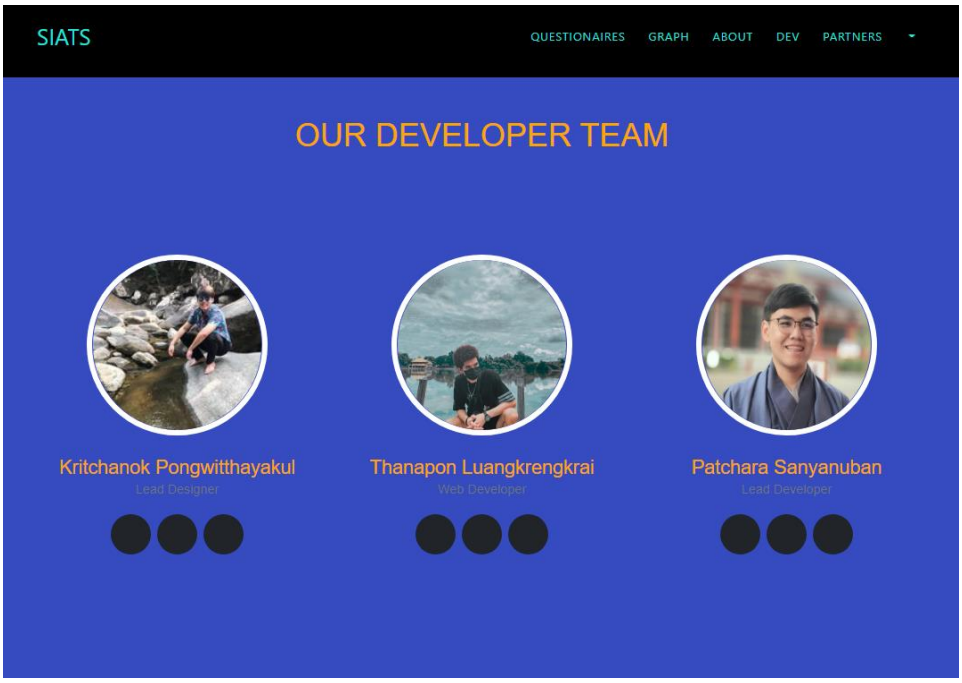


Figure 3.14: Developer team

In Figure 3.14 it will show the details of our developer team.

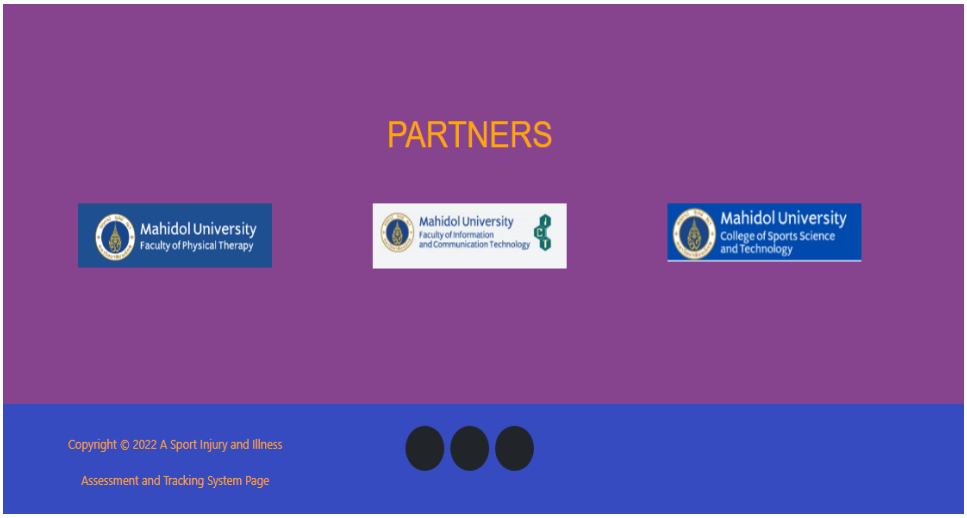


Figure 3.15: Partners

In Figure 3.14 it will show the faculty which we corporate with.

Figure 3.16: Profile

In Figure 3.16 it will show the information of profile which can edit the weight.

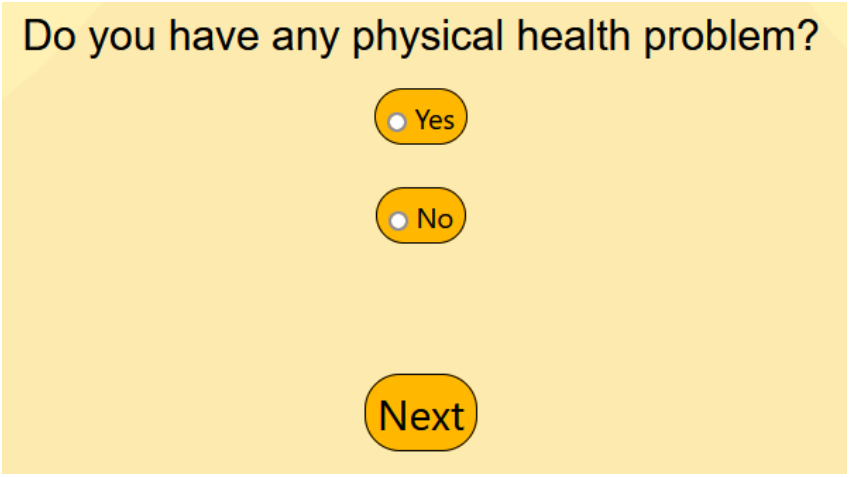


Figure 3.17: First question in physical part

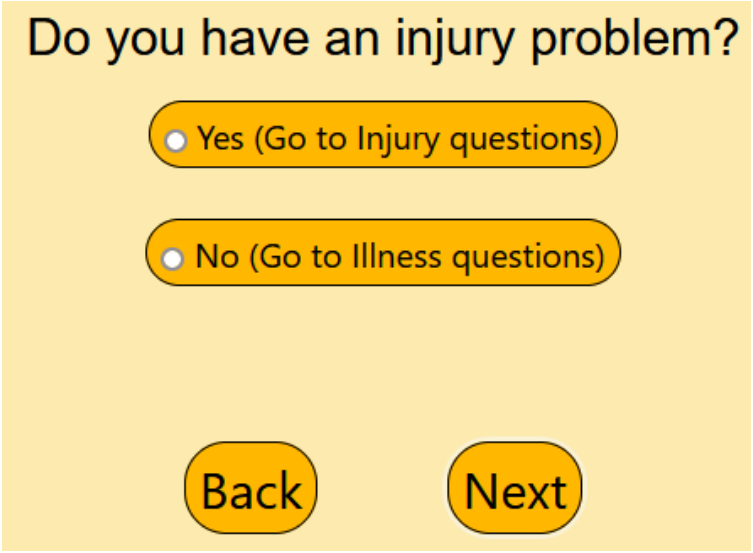


Figure 3.18: Physical question

In Figure 3.18 shows the question of Physical question that asks the athlete "Do you have an injury problem" if the athlete checks "Yes" it will bring the athlete to Figure 3.16 - 3.19. But if athlete checks "No" it will skip injury question to illness question (Figure 4.13)

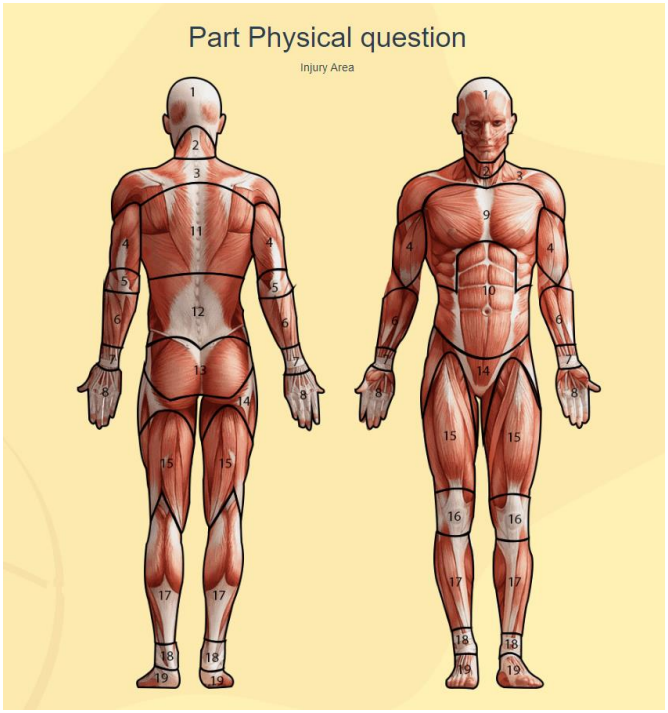


Figure 3.19: Anatomy

In Figure 3.19 will show the anatomy part and number that athlete can be easy to understand which part that they should click (Figure 3.10)

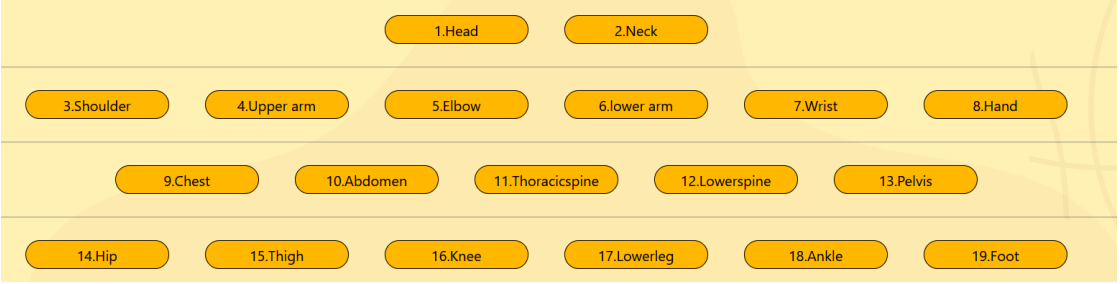


Figure 3.20: Body part

In Figure 3.20 is divided into 4 parts. Which is upper part, chest part, thigh part, lower part, athlete also can recheck the number of buttons to anatomy picture (Figure 3.9)

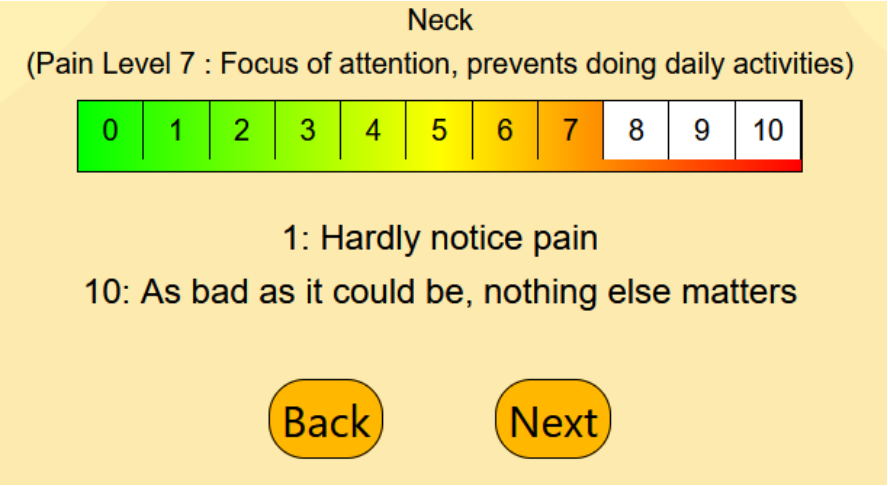


Figure 3.21: Body part pain level

In Figure 3.21 For the following Figure 3.10 it will let athletes rate their pain level which is easy to understand because of the color of the rating bar.

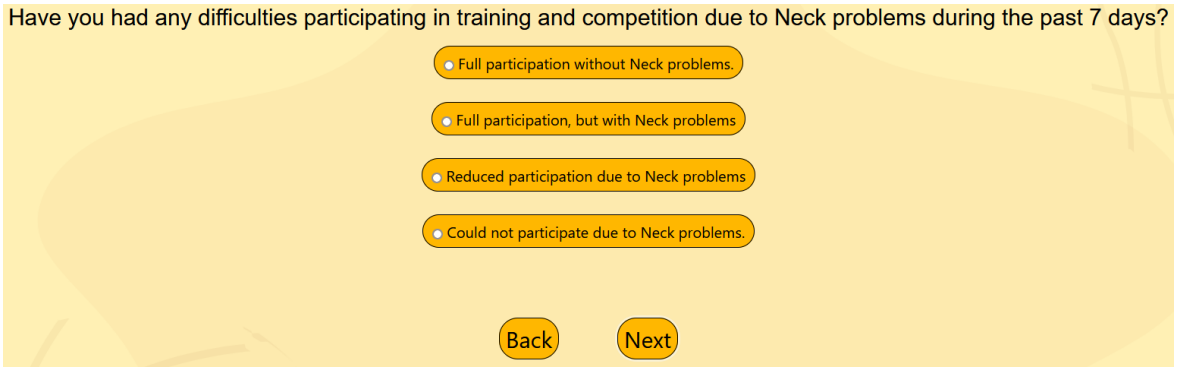


Figure 3.22: Body part questions

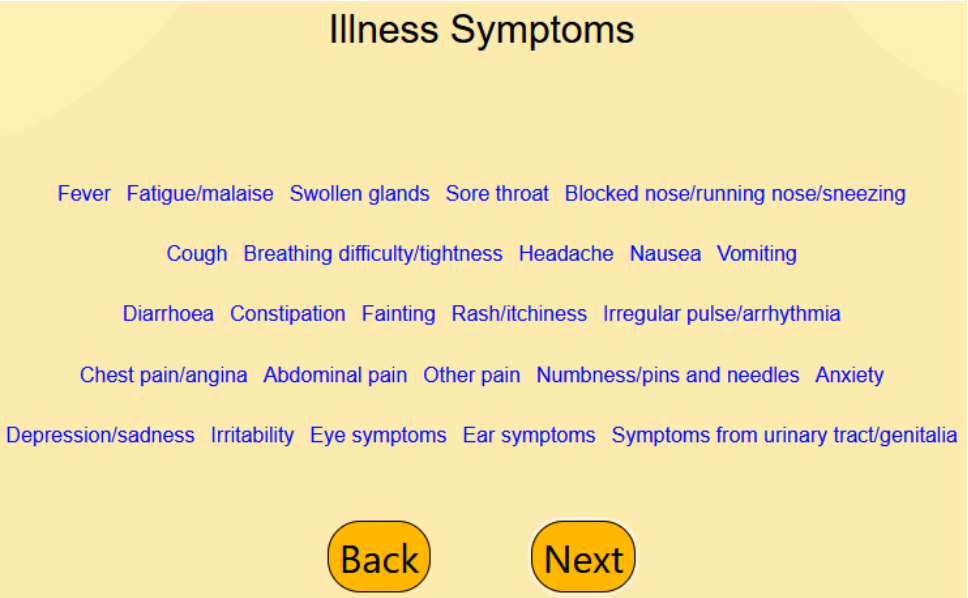


Figure 3.23: Illness

In Figure 3.22 is the illness symptoms section, athletes can select which does athlete have.

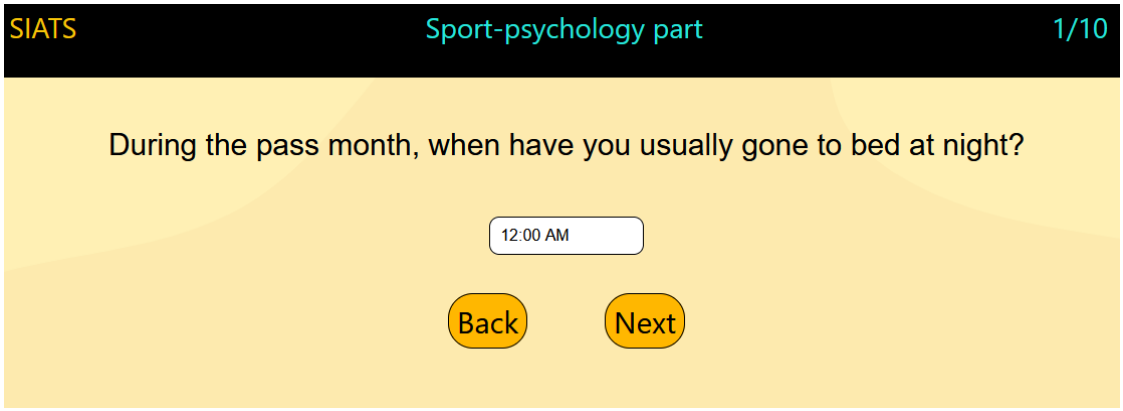


Figure 3.24: Sport Psychology question

In Figure 3.23 is the Sport Psychology question part, In the figure 3.14 when click the time it will pop up the following figure (Figure 3.15).

Figure 3.25: Time picker

In Figure 3.24 is the Sport Psychology question part, In the figure 3.15 user can select time to answer the Psychology question.

Figure 3.26: Sport Psychology question Part 2

In Figure 3.25 will ask the athlete the question and let them rate it. We design the rating bar with red to green to make it easy to understand that number 0 is No confidence and number 10 is complete confidence.

Firstname	Lastname	ID	DOB	Height	Weight	Sport type	Athlete information
Search							
athlete	athlete Lastname	24	2022-05-12	100	50	socker	Info
meg	megg	3	2022-03-10	185	65	football	Info
ohmuz	tidtid	44	2022-05-18	100	100	kite	Info

Figure 3.27: Medical Team section

In Figure 3.26 is the medical team section where they can see all the athlete information and they can see specifically athlete information by searching it (Figure 3.27).

Date	Injured Part	Pain Level	Question Score	Reported problem to
2022-04-07T17:00:00.000Z	Upper arm	7	100	Other Olympiatoppen doctor
2022-04-07T17:00:00.000Z	Thoracicspine	2	72	Other Olympiatoppen doctor
2022-04-07T17:00:00.000Z	Knee	6	100	Other Olympiatoppen doctor
2022-04-14T17:00:00.000Z	Head	0	0	

Figure 3.28: athlete information

In Figure 3.27 will show the personal athlete information that medical team want to see.

CHAPTER 4
IMPLEMENTATION

This chapter includes hardware and system environment and implementation guide and technique that is used in the coding processes of this project.

4.1 Hardware and System Environment

4.1.1 Environment for using applications

- Browsers:
    - Safari
    - Google Chrome
    - Internet Explorer
    - Firefox
- Internet connection

4.1.2 Environment for development applications

- Operating System and Devices for Development
    - Window 10
    - Lenovo
        - Intel(R) Core(™) i7-7700HQ CPU @ 2.80GHz
        - Installed RAM 16 GB
        - x64-based PC
    - Postman
- Java Script and SQL Environment Management
    - Visual studio code
        - vue.js (vue2)
        - node express
        - SQL
- Database Management System (DBMS)
    - Xampp V3.3.0
        - phpMyAdmin
        - localhost
    - Heroku
    - MySQL Workbench 8.0 CE

- Programing and Scripting Tools
  - axios
  - Components
    - Timepicker
  - Props
  - CSS
  - HTML
  - SQL
  - Java Script
  - Netlify

4.2 Implementation Guide and Techniques

Start with using command prompt to run the command “cd <project directory>” Run the xampp with Apache or connect with MySQL workbench then run Visual Studio code terminal console Frontend type “npm run serve” Backend type “npm run dev” the HTTP Server with port 8081 for Frontend, port 3000 for Backend.

4.2.1 Setup Back-end side

```
const mysql = require("mysql");

// const connection = mysql.createPool({
//   host: "localhost",
//   user: "root",
//   database: "question_db",
//   password: "",
// });

const connection = mysql.createPool({
  host: "us-cdbr-east-05.cleardb.net",
  user: "bf3554d49af934",
  database: "heroku_878d3051ee44c37",
  password: "defd1b35",
});
// connection.connect();
module.exports = connection;
```

Figure 4.1:Setup connection with database in Backend Side

In Figure 4.1 show the connection between the Database with the backend, in line 8 is the table name that has been created in the database.

```
router.get("/questions", function (req, res) {
  db.query(`SELECT *  FROM questionnaires`, (error, result, field) => {
    return res.send({ data: result });
  });
});
```

Figure 4.2: How to get the questionnaire from database

In Figure 4.2 show that this router gets all questions in the table name "questionnaires"

```
router.post("/userInfo", function (req, res) {
  const userInfo = jwt.decode(req.body.token);
  const username = userInfo.username;
  const id = userInfo.userId;
  console.log("userInfo", userInfo);
  db.query(
    `INSERT INTO athscore (username,user_id) VALUES ('${username}', '${id}'  )`,
    // `SELECT firstname,id FROM users WHERE id = '${userInfo.id}'`,
    (error, result, field) => {
      console.log(result);
      return res.send({ data: result });
    }
  );
});
```

Figure 4.3: Example of Backend Side (post user information)

In Figure 4.3 shows that "post" is sent the data to the database which can also insert or update the data in the table that can change the table name.

4.2.2 Setup Front-end side

It consists of views, components, router folders. For the folder structure we mostly use atomic design patterns to organize and categorize each part of a web application.

```vue
<template>
  <div class="hello">
    <h1>{{ msg }}</h1>
  </div>
</template>

<script>
export default {
  name: "HelloWorld",
  props: {},
};
</script>

<!-- Add "scoped" attribute to limit CSS to this component only -->
<style scoped></style>
```

Figure 4.4: Example of Frontend Side (Template)

● Views

This folder is used to keep all each page in web application, each file consists of

● Template

Globally registered components can be used in the template of any root Vue instance to render HTML

```vue
<style scoped>
h3 {
  margin: 40px 0 0;
}
ul {
  list-style-type: none;
  padding: 0;
}
li {
  display: inline-block;
  margin: 0 10px;
}
a {
  color: #42b983;
}
</style>
```

Figure 4.5: how to set style in Frontend Side

● Style: style sheet language used for describing the presentation of a document.

```
export default {
  mounted: async function () {···
  },
  data() {···
  },
  async created() {···
  },
  name: "Homepage",
  methods: {···
  },
};
</script>
```

Figure 4.6: Example of Frontend Side (Script)

● Script: it is used to manage the state, licycle, and event to make interactivity for that webpage.

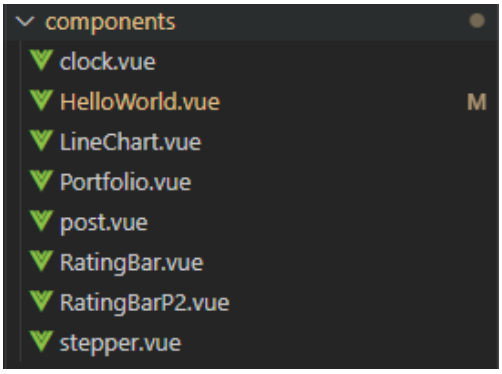


Figure 4.7: Components for the application

● Components

This folder is used to keep each component which can be reused for multiple views such as input, select, layout, card, and so on. Most of the components are stateless; it means that is used to display the information only, not used to change some states in the parent component or view.

```
import axios from "axios";

const url = "http://localhost:3000/api/";

export default {
  getSumByUsername(username) {
    return axios
      .get(url + "getSumByUsername/", { params: { username: username } })
      .then((response) => response.data);
  },

  getSumInjury(username) {
    return axios
      .get(url + "getSumInjury/", { params: { username: username } })
      .then((response) => response.data);
  },
};
```

Figure 4.8: Set up Services for graph

● Services

It is the middle layer between presentation and data store. It abstracts business logic and data access. This folder is used to keep utility functions to communicate with low-level databases, call API to the backend side, and transform data to make it suitable for rendering on a webpage.

```
import mainAdmin from "../views/mainAdmin.vue";
import adminInfo from "../views/adminInfo.vue";
Vue.use(VueRouter);

const routes = [
  {
    path: "",
    name: "Homepage",
    component: Homepage,
  },
  {
    path: "/mainAdmin",
    name: "mainAdmin",
    component: mainAdmin,
  },
```

Figure 4.9:Set up Router part

● Router

It is a collection of navigational components that compose declaratively with our application to navigate to a new page and serve a mapping view. It also makes a view transition effect when the URL route is changed.

4.3 Development Process in Front-end side

1. In case of installing new plugins such as Toast library, calendar components. Please see on “main.js” which contain all of plugins that our application use

```
Vue.use(BootstrapVue);
// Optionally install the BootstrapVue icon components plugin
Vue.use(IconsPlugin);

Vue.config.productionTip = false;
Axios.defaults.headers.common["Authorization"] = `Bearer ${store.state.token}`;
new Vue({
  router,
  store,
  render: (h) => h(App),
}).$mount("#app");
```

Figure 4.10: Example of Development Process (main.js)

2. Create new components for example, Card, Input, Select.

a. Go to “components” folder

b. creates a new file, follow Vue.JS file structure (Template, Script, Style), then add props validation which is used to pass some properties from parent component to render on that new component.

```
</template>
<script>
export default {
  name: "RatingBar",
  props: ["RadioName"],

  methods: {
    getRatingScore(score) {
      console.log("Ratingscore", score);
      this.$emit("RatingBarScore", score, this.RadioName);
    },
  },
};
</script>
```

Figure 4.11: How to Declare Props to Get Values from the Other Components

3. Create new page

a. Go to “views” folder

b. creates new file and follow Vue.JS file structure (Template, Script, Style)

c. edit “router/index.js” to add new route by adding it to ‘routes’ variable

```
{
  path: "/Stepper",
  name: "Stepper",
  component: Stepper,
},
{
  path: "/Introquestion",
  name: "Introquestion",
```

Figure 4.12: Example of Development Process (new page)

4. Create new Service

   a. Go to “services” folder

   b. Create a new file and write function for your purpose.

```
import axios from "axios";

const url = "http://localhost:3000/api/";

export default {
  getSumByUsername(username) {
    return axios
      .get(url + "getSumByUsername/", { params: { username: username } })
      .then((response) => response.data);
  },

  getSumInjury(username) {
    return axios
      .get(url + "getSumInjury/", { params: { username: username } })
      .then((response) => response.data);
  },
};
```

Figure 4.13: Example of Development Process (new service)

4.4 Development Process in Back-end side

```
const mysql = require("mysql");

const connection = mysql.createConnection({
  host: "localhost",
  user: "root",
  database: "question_db",
  password: "",
});

connection.connect();
module.exports = connection;
```

Figure 4.14: How to connect database (Development Process)

4.4.1 In folder file name “lib >> db.js” it connects the database name and host is local host

4.4.2 In folder routes>>router first import express and router first that is the important thing. And connecting to the database with db.

```
const express = require("express");
const router = express.Router();

const bcrypt = require("bcryptjs");
const uuid = require("uuid");
const jwt = require("jsonwebtoken");

const db = require("../lib/db.js");
const userMiddleware = require("../middleware/users.js");
```

Figure 4.15: How to import Database to backend

4.4.2 User router.get to get element in table in the database, use post to insert or update an element in the table by SQL structure.

CHAPTER 5
Testing And Evaluation

This Chapter explains how the web application has been tested and what the results have been.

5.1 Unit Tests

For the unit tests we selected some of the important process for formal unit testing which include

- Process 1: Register
- Process 2: Login
- Process 3: Settings
- Process 4: Homepage Nav Bar
- Process 5: Questionnaires
- Process 6: Summary Score

5.1.1 Test Perform on Process 1 Register

*Table 5.1**: Register***

Operation Performed	**Condition Tested**	**Actual Result**
1.Register	Be able to fill in the register form	Pass
2.Register Button	Be able to click the register button	Pass

5.1.2 Test Perform on Process 2 Login

*Table 5.2**: Login***

Operation Performed	**Condition Tested**	**Actual Result**
1.Username and Password	Be able to fill the username and password	Pass

2.Login Button	Be able to use the username	Pass

5.1.3 Test Perform on Process 3 Settings

*Table 5.3**: Settings***

Operation Performed	Condition Tested	Actual Result
Language	Be able to change language	Pass

5.1.4 Test Perform on Process 4 Homepage NavBar

*Table 5.4**: Homepage NavBar***

Operation Performed	Condition Tested	Actual Result
Link inside the same page	Be able to click nav bar button to another layer in the same page	Pass
Link outside	Be able to click nav bar button to another layer in the other page	Pass

5.1.5 Test Perform on Process 5 Questionnaires

*Table 5.5**: Questionnaires***

Operation Performed	Condition Tested	Actual Result
Questionnaires Button	Be able to go to Questionnaires page via “click here” button	Pass

5.1.6 Test Perform on Process 6 Summary Score

*Table 5.6**: Summary Score***

Operation Performed	Condition Tested	Actual Result

Summary Score	Be able to go to graph score on the last page after done questionnaires	Pass
Drop down function	Be able to select part of Injury and see the score	Pass

5.2 System Integration test

This activity is performed after the system is completely integrated. The purpose of this testing is to check whether the system can operate correctly according to the required functions or not.

Table 5.7 System Integration Test

Function	Description	%Executed	%Passed	Remarks
Register	Check new user is created	100%	100%	-
Login	Check created user can login.	100%	100%	-
Setting	Check if the user can change the language.	100%	100%	-
Homepage NavBar	Check the user can click on all the buttons in the navigation bar.	100%	100%	-
Questionnaires	Check users can be able to go to Questionnaires page via “click here” button	100%	100%	-
Summary Score	Check users can be able to go to Graph page via “Graph” button in NavBar	100%	100%	-

5.2.1 Test Scenario

In order to test all functional aspects of the system thoroughly, we had set up a test scenario which consisted of 5 phases as shown below.

- Register successfully
- Register failed
- Login successfully
- Login failed
- Complete the questionnaires.
- Failed to complete questionnaires.

Moreover, the test scenario can be used as a user guideline because it covers all the steps necessary in order to use our system. The details of each phase are shown in the next section.

Register Part

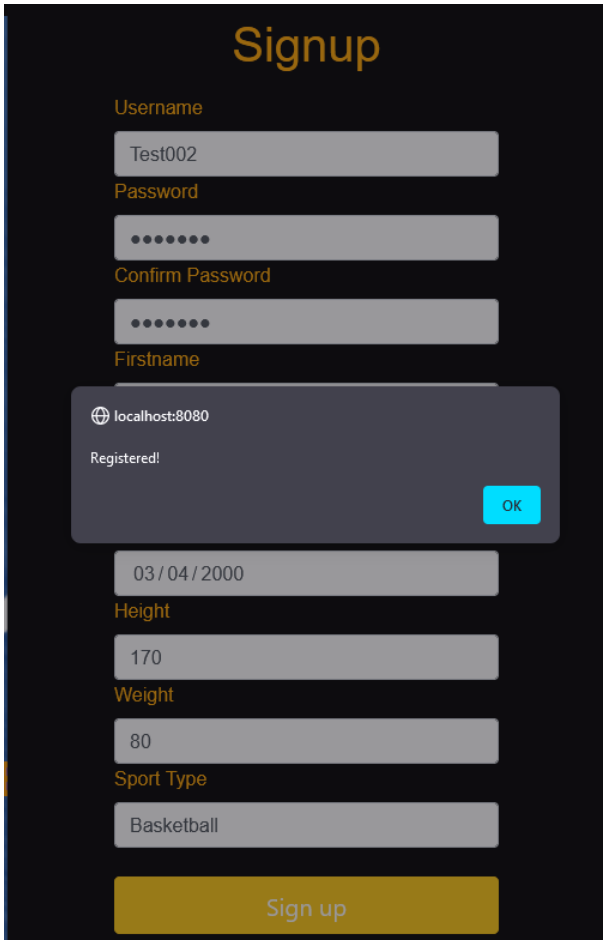


Figure 5.1: Register

On the register part when you put the information to register it will pop-up the button showing you registered.

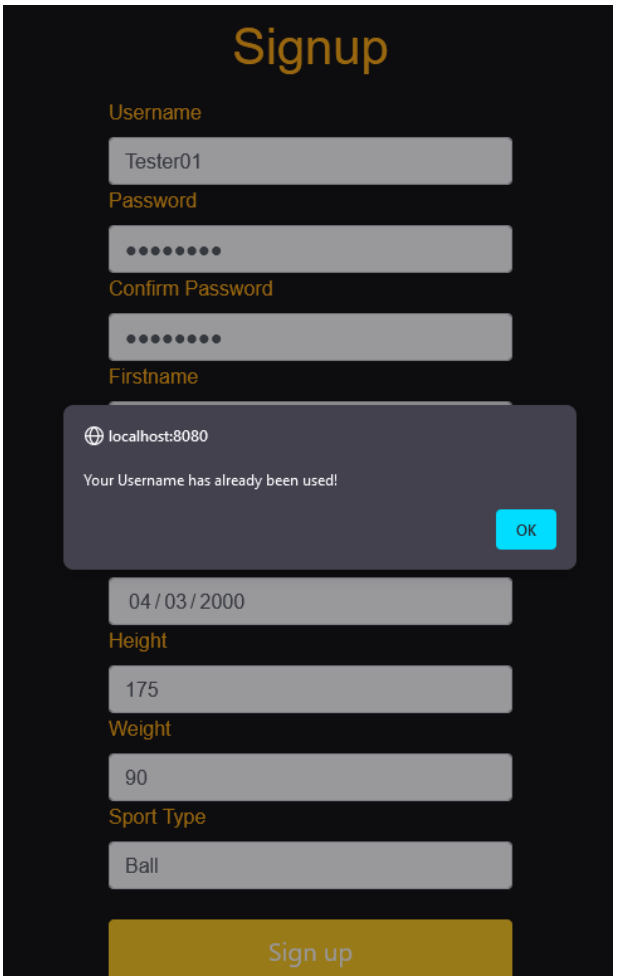


Figure 5.2: Username already used

When you put information frequently it will show the pop-up “Your Username has already been used”.

Login Part

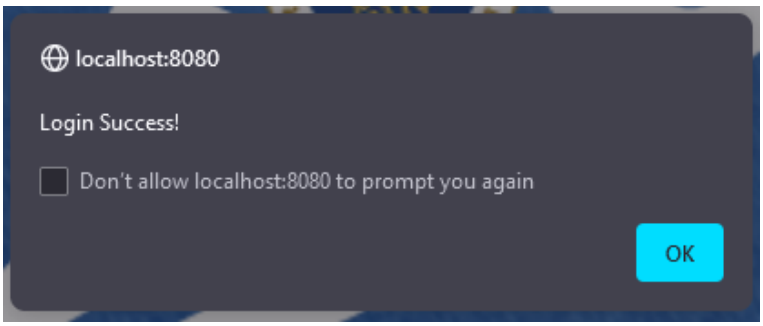


Figure 5.3: Login

When you click the sign in button with the correct username and password it will pass to the homepage directly.

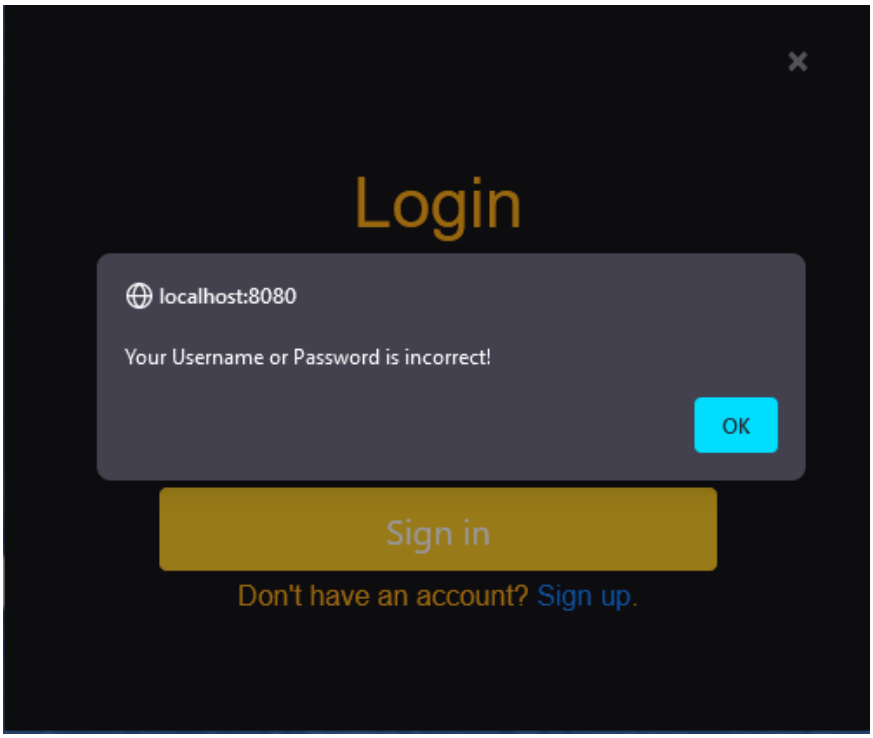


Figure 5.4: Login failed

When you put the wrong username or password it will show the pop-up “Your Username or Password is incorrect!”.

Questionnaires Part

Figure 5.5: Intro question

If you choose that you do not have any problem the system will pop out, you to the Homepage.

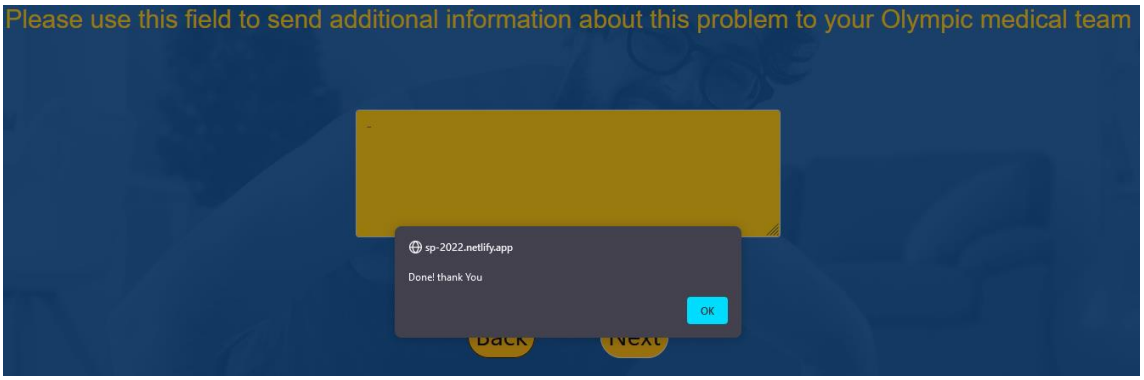


Figure 5.6: Answer all questionnaires

If you answer all the questionnaires the information will be saved as the score to show in the graph page.

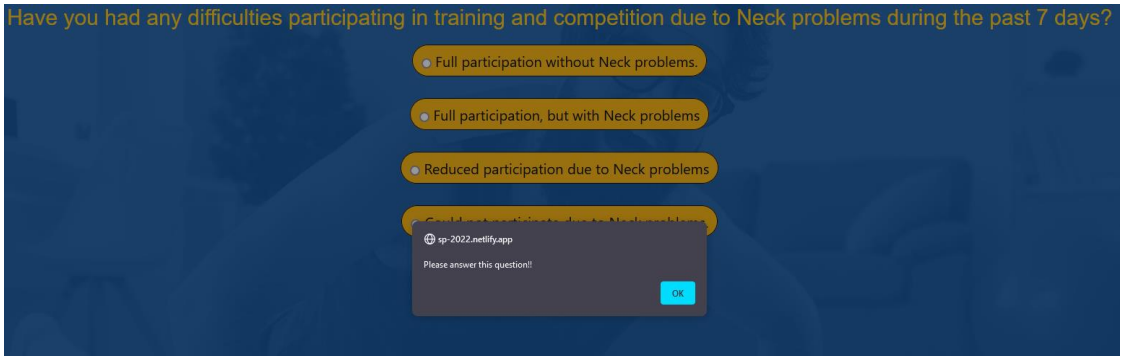


Figure 5.7: Not answer at all

If you do not answer the question, it will show the pop-up “Please answer this question”.

5.3 Usability and Satisfaction Evaluation

Our usability and satisfaction evaluations are divided into two categories: usability evaluation for athletes and usability evaluation for medical teams. We have received volunteers to do usability test of 10 of persons form Sport Scient Faculty by futsal team and 5 persons from medical teams and coaches. This is to users fill out the form via google form after trying the SIATS application. We have shown the process of using the application via the Discord app by live stream.

Summary of results from usability and satisfaction of athletes and staff based on Likert scales [6], divided by weight according to the following criteria:

- 1.00 - 2.49 means insignificant interesting, satisfied, or helpful.
- 2.50 - 3.49 means moderately interested, satisfied, or helpful.
- 3.50 – 4.49 means very interested, satisfied, or helpful.
- 4.50 – 5.00 means most interested, satisfied, or helpful.

Table 5.8 The results from athletes

Question No.	**Average scores**	**Meaning of the scores**
1. Help in self-assessment.	4.10	very interested, satisfied, or helpful.
2.The satisfaction with login or registration.	4	very interested, satisfied, or helpful.
3.The satisfaction in Take the questionnaires.	3.90	very interested, satisfied, or helpful.
4.The satisfaction in Graph and Profile.	3.40	moderately interested, satisfied, or helpful.
5. Web attractiveness.	3.90	very interested, satisfied, or helpful.

6. Interest in returning to use the website.	3.70	very interested, satisfied, or helpful.

Table 5.9 The results from medical teams

Question No.	**Average scores**	**Meaning of the scores**
1. assisting in the assessment of athletes.	5	most interested, satisfied, or helpful.
2.The satisfaction with login.	4.20	very interested, satisfied, or helpful.
3.The satisfaction of displaying all athlete information.	4.00	very interested, satisfied, or helpful.
4.The satisfaction of individual athlete data display.	4.60	most interested, satisfied, or helpful.
5. Web attractiveness	4.40	very interested, satisfied, or helpful.
6. Interest in returning to use the website.	4.40	very interested, satisfied, or helpful.

CHAPTER 6
Conclusions

6.1 Conclusion

Due to the inefficient of information that hard to collect via traditional paper collection consequently we decided to implement web application which namely SIATS that stands for A Sport Injury and Illness Assessment and Tracking System in order to solve the waste of paper used issue. Apart from that, let's focus on the target of SIATS, which is developing a web application for tracking the athletes' scores week by week for staff to get information on how athletes are improving, they also have questionnaires for injury reports to let the medical team know and send athletes for treatment. SIATS is a web application that lets the user do questionnaires which are Injury part, Illness part, and Sport Psychology part. Every part will collect the data via the database server for the medical team or staff to look at the athlete score to take the scores to analyze how athletes are ready or not. In addition, SIATS can help use less paper to fix the problem of global warming too.

6.2 Benefit

This project has several benefits to both developers and users.

6.2.1 Benefits To Project Developers

- Project Developers have a chance to use their knowledge when studying at Faculty.
- Project Developers have a chance to learn how to develop and deploy the Web application.

6.2.2 Benefits To Users

- Users, especially people who are relevant to Sport can use it for tracking their own skills scores statistics week by week.
- The medical team can follow up on injuries, illnesses of athletes.

6.3 Problem and Limitations

- Don’t have a system that knows the user's concentration to select a choice or just random choice.
- The duration of the graph to be displayed cannot be selected.
- Staff are unable to send advice to athletes through our system.
- Heroku can use only 550 hr./month
- Can't change language while doing questionnaires.

6.4 Future work

- Users can contact the hospital in case of a huge emergency case.
- We can deploy a type of native app to make it more comfortable to athletes and medical teams.
- A system that allows staff to send advice to athletes.
- The users can select the period of the graph showing the score.
- User will be able to change the language while completing the questionnaires.

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