Group Project Product Backlog – Dementia Application

Group Members:

1. Group leader & Machine Learning – Daniel Soden
2. Database & Backend – Fawaz Olatunji
3. Mobile Development – Ben Murphy
4. Website Development – Gavin Moore

- Each group member in this project will do an equal amount of work relative to their role and also help others out when needed. For example, sectors such as machine learning and website development may not be as involved as say constructing and connecting a database across the project, or as complex as implementing all the different requirements in the mobile application's questionnaire. So we will all pull our weight and help each other in other areas where required.
- Elements of this product backlog may change, this is primarily a guidline to keep us on track for each sprint.

Daniel Soden – Machine Learning/Agent Product backlog

Tech Stack:

Language(s): Primarily python3.13 , with some bash scripting when needed
Framework(s): CrewAI and Tensorflow
Other relevant technology: Git/Github & Deepseek platform

Product Backlog (Broken down into sprints)

Sprint 1 – Agent Setup

- ☐ Create yaml file for research agent
- ☐ Setup deepseek api for retrieval of data
- ☐ Create yaml file for research task
- ☐ Create yaml file for reporting agent
- ☐ Create yaml file for reporting task
- ☐ Design system to weekly retrieve said reports in a json format and send it to a mongodb or other form of database

Sprint 2 – Tensorflow beginnning

- ☐ Begin research and testing on taking train and test data with tensorflow
- ☐ Reformat cc and cd dementia data into true false speech pairs showing which do and don't have dementia
- ☐ Begin tinkering with manual training of formatted data and then testing out with dementia data
- ☐ Test out training deepseek on the formatted cc and cd data and try out responses using crewai or simple query calls in python

Sprint 3 – Close up Tensorflow work

- ☐ Design and train a tensorflow model on this cc and cd data for risk assesment that returns back a value from 0-3 signifying no risk,low risk, medium risk, high risk.
- ☐ With said data, using deepseek, give a breakdown on why this user may or may not have dementia and save as a markdown response which is parsed on the mobile end for users upon payment

Fawaz Olatunji – Backend/Database

Tech Stack:

Language(s): Golang & PostgreSQL

Frameworks(s): Fiber (Go)

Product Backlog (Broken down into sprints)

Sprint 1 – Database design, Gin setup

- ☐ Get to terms with golang, gin and sqite syntax/differences between mysql syntax
- ☐ Design 2/3NF database tables for users, accounts, tests, results etc for exchange between mobile and web
- ☐ Have basic functionality of web server running for future of exchange of data between web and mobile.
- ☐ SQL Scripts made for creation of tables and potential selects designed.
- ☐ Tinker with docker containers so that product can run seamlessly on any machines.

Sprint 2- API Design

- ☐ Look into how to save user data in mobile and web applications and be able to select said data from either side
- ☐ Ensure data saved is able to be encrypted and decrypted easily (bcrypt etc)

Sprint 3 – Local Hosting

- ☐ Using docker, host the Postgresql and Mongo instance for the user and AI data
- ☐ Have the AI and web server running locally on Ben's server.
- ☐ Look into optimizations for data being sent to and from the mobile app and web app

Ben Murphy – Mobile

Tech Stack:

Language(s): Kotlin

Frameworks(s): Jetpack compose (UI) & Springboot (Connection to backend)

Other relevant technology: Local android app simulation on personal device

Product Backlog (Broken down into sprints)

Sprint 1 – Basic UI, Signup, Login & Home

- ☐ Get to terms with Kotlin and then Jetpack compose elements for android
- ☐ Create a general mockup of three primary starting pages (Login,register & Home dashboard)
- ☐ Work on implementing said mockup in simplistic design pieces
- ☐ Create classes in kotlin to store user information
- ☐ Implement basic login & register functionality with volatile arraylist
- ☐ Create basic jetpack compose component for ai news cards in dashboard

Sprint 2- Questionnaire design

- ☐ Create classes for questions, results and any other necessary data stores
- ☐ Create singleton database connection to save patient data (patient end is mobile)
- ☐ Create components for question pages, keep answers in an array and save at the end of questionnaire.
- ☐ Tinker with speech to text api and if possible integrate into prototype tile in home page
- ☐ Integrate AI Components loading each week at home dashboard

Sprint 3 – Connection wrap up

- ☐ Along with AI news summaries for patients, include components on home dashboard showing statistics relating to the users likelihood of having dementia
- ☐ Implement payment system that upon finishing questionnaire and speech test, can get roughly accurate results from Large Language model
- ☐

Gavin Moore – Web

Tech Stack:

Language(s): HTML, CSS & Typescript

Frameworks(s): ReactJS & Tailwind CSS

Product Backlog (Broken down into sprints) – Sprint content similar to Ben's to keep progress parity.

Sprint 1 – Basic UI, Signup, Login & Home

- ☐ Get to terms with Reactjs and then tailwindcss so we can construct individual components
- ☐ Create a general mockup of three primary starting pages (Login,register & Home dashboard)
- ☐ Work on implementing said mockup in simplistic design pieces
- ☐ Create types in Typescript to store user information
- ☐ Implement basic login & register functionality with volatile array
- ☐ Create React component for ai research cards in dashboard

Sprint 2- Doctor evaluation design

- ☐ Create types for patient results and any other necessary data stores
- ☐ Create singleton database connection to save doctor and result data (doctor end is web)
- ☐ Create components for tables storing a doctors multitude of patients and their status
- ☐ Integrate AI Components loading each week at home dashboard

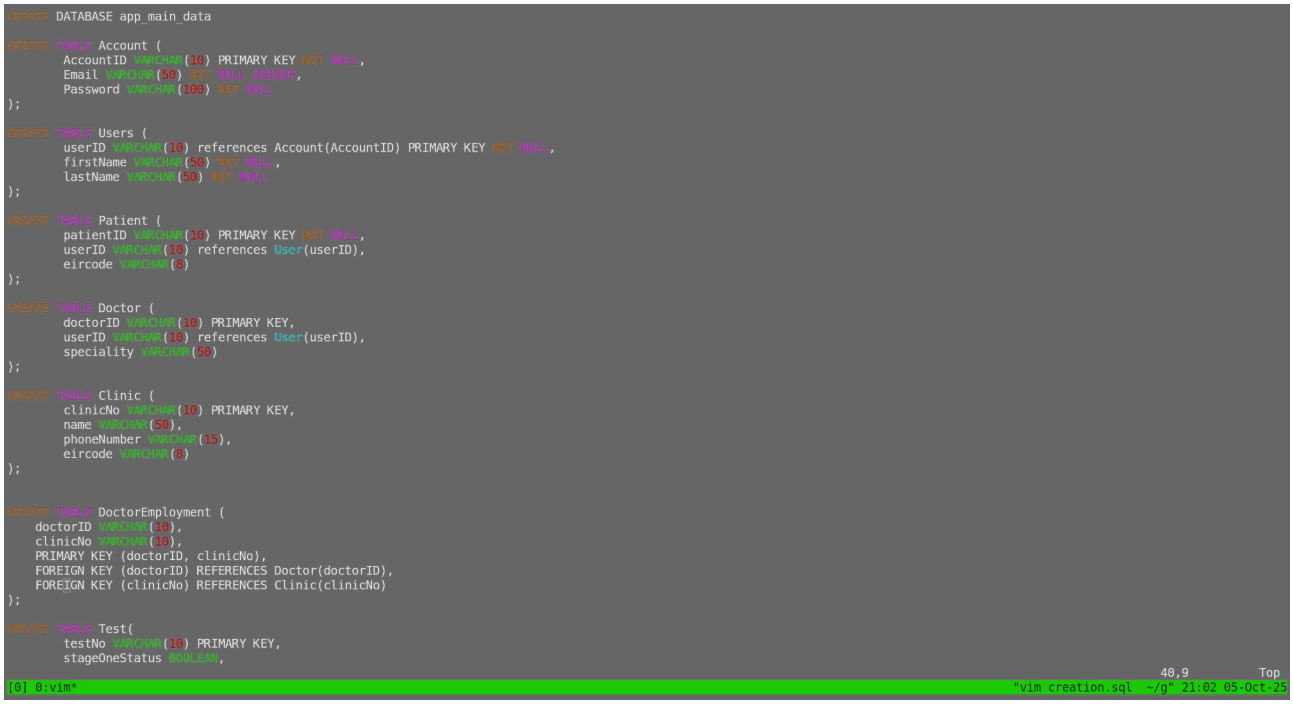
Sprint 3 – Connection wrap up

- ☐ Along with AI news summaries for doctors, include components on home dashboard showing statistics relating to the number of patients to evaluate and other information
- ☐ Ensure data can be sent to and from mobile application to the web application

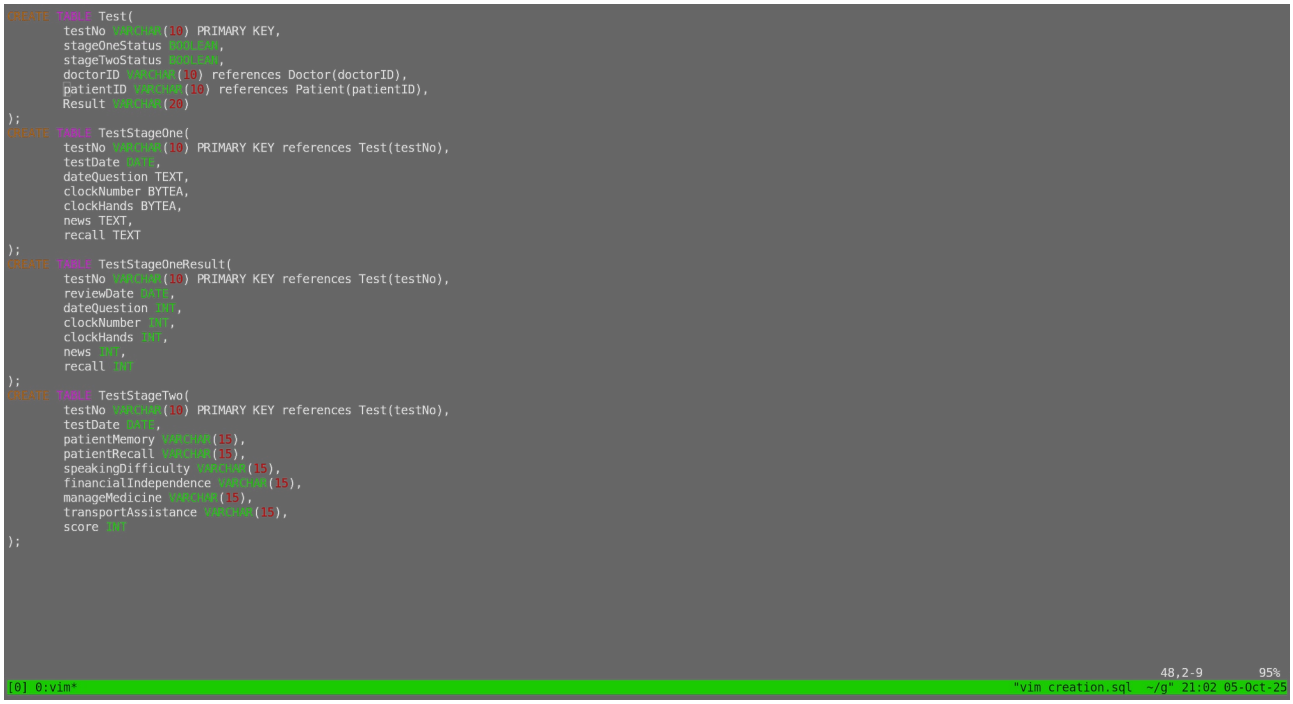
Prototype/Progress

Code available at: github.com/daniel04soden/group-project

NMS-Backend – Database table setup and fiber hello world



```
CREATE DATABASE app_main_data

CREATE TABLE Account (
        AccountID VARCHAR(10) PRIMARY KEY NOT NULL,
        Email VARCHAR(50) NOT NULL UNIQUE,
        Password VARCHAR(100) NOT NULL
);

CREATE TABLE Users (
        userID VARCHAR(10) references Account(AccountID) PRIMARY KEY NOT NULL,
        firstName VARCHAR(50) NOT NULL,
        lastName VARCHAR(50) NOT NULL
);

CREATE TABLE Patient (
        patientID VARCHAR(10) PRIMARY KEY NOT NULL,
        userID VARCHAR(10) references User(userID),
        eircode VARCHAR(8)
);

CREATE TABLE Doctor (
        doctorID VARCHAR(10) PRIMARY KEY,
        userID VARCHAR(10) references User(userID),
        speciality VARCHAR(50)
);

CREATE TABLE Clinic (
        clinicNo VARCHAR(10) PRIMARY KEY,
        name VARCHAR(50),
        phoneNumber VARCHAR(15),
        eircode VARCHAR(8)
);


CREATE TABLE DoctorEmployment (
    doctorID VARCHAR(10),
    clinicNo VARCHAR(10),
    PRIMARY KEY (doctorID, clinicNo),
    FOREIGN KEY (doctorID) REFERENCES Doctor(doctorID),
    FOREIGN KEY (clinicNo) REFERENCES Clinic(clinicNo)
);

CREATE TABLE Test(
        testNo VARCHAR(10) PRIMARY KEY,
        stageOneStatus BOOLEAN,
                                                                    40,9          Top
[0] 0:vim*                                                "vim creation.sql  ~/g" 21:02 05-Oct-25
```



```
CREATE TABLE Test(
        testNo VARCHAR(10) PRIMARY KEY,
        stageOneStatus BOOLEAN,
        stageTwoStatus BOOLEAN,
        doctorID VARCHAR(10) references Doctor(doctorID),
        patientID VARCHAR(10) references Patient(patientID),
        Result VARCHAR(20)
);
CREATE TABLE TestStageOne(
        testNo VARCHAR(10) PRIMARY KEY references Test(testNo),
        testDate DATE,
        dateQuestion TEXT,
        clockNumber BYTEA,
        clockHands BYTEA,
        news TEXT,
        recall TEXT
);
CREATE TABLE TestStageOneResult(
        testNo VARCHAR(10) PRIMARY KEY references Test(testNo),
        reviewDate DATE,
        dateQuestion INT,
        clockNumber INT,
        clockHands INT,
        news INT,
        recall INT
);
CREATE TABLE TestStageTwo(
        testNo VARCHAR(10) PRIMARY KEY references Test(testNo),
        testDate DATE,
        patientMemory VARCHAR(15),
        patientRecall VARCHAR(15),
        speakingDifficulty VARCHAR(15),
        financialIndependence VARCHAR(15),
        manageMedicine VARCHAR(15),
        transportAssistance VARCHAR(15),
        score INT
);

                                                                    48,2-9        95%
[0] 0:vim*                                                "vim creation.sql  ~/g" 21:02 05-Oct-25
```

```
daniel@daniels0den ~/g/nms-backend (main)> ls
creation.sql  dematia_app/  dementia  docker  todo.md
daniel@daniels0den ~/g/nms-backend (main)> cd dematia_app/
daniel@daniels0den ~/g/n/dematia_app (main)> tree
.
├── cmd
│   └── main.go
├── go.mod
├── go.sum
└── model
    ├── account.go
    ├── clinic.go
    └── test.go

3 directories, 6 files
daniel@daniels0den ~/g/n/dematia_app (main)> cat cmd/main.go
package main

import (
    "log"
    "database/sql"

    "github.com/gofiber/fiber/v2"
    _ "github.com/lib/pq"
)

const (
    host = "localhost"
    port = 4000
    user = "postgres"
    password = secret
    dbname = ""
    )


func main() {

    app := fiber.New()

    app.Get("/", func(c *fiber.Ctx) error {
        return c.SendString("Hello, World 👋!")
    })

    log.Fatal(app.Listen(":3000"))
}
daniel@daniels0den ~/g/n/dematia_app (main)>
[0] 0:fish*                                                    "~/g/n/dematia_app" 21:04 05-Oct-25
```

```
daniel@daniels0den ~/g/n/d/model (main)> cat account.go
package model

type Patient struct {
        ID string
        firstName string
        lastName string
        phoneNumber string
        eircode string
}

type Doctor struct {
        ID string
        firstName string
        lastName string
        phoneNumber string
        eircode string
}
daniel@daniels0den ~/g/n/d/model (main)>
```

NMS-AI – Article research and retrieval

Agent descriptions:

```yaml
dementia_patient_news_reporter:
  role: >
    Dementia News Reporting Analyst For Patients
  goal: >
    Create simple reports based on dementia news sources and research findings for patients and normal civillians to use
  backstory: >
    You're a meticulous reporter with a considerate approach to reporting on news. You're known for
    your ability to turn complex data and hard news stories into easy to digest and consise summaries, making
    it easy for patients and other users to understand and act on the information you find.

dementia_professional_news_reporter:
  role: >
    Dementia News Reporting Analyst For Professionals
  goal: >
    Create detailed reports based on dementia news sources and research findings for doctors and other medical professionals to use
  backstory: >
    You're a meticulous reporter with a keen eye for detail. You're known for
    your ability to turn complex data and hard news stories into clear and concise posts, making
    it easy for medical professionals to understand and act on the information you provide.
```

Task description for agents:

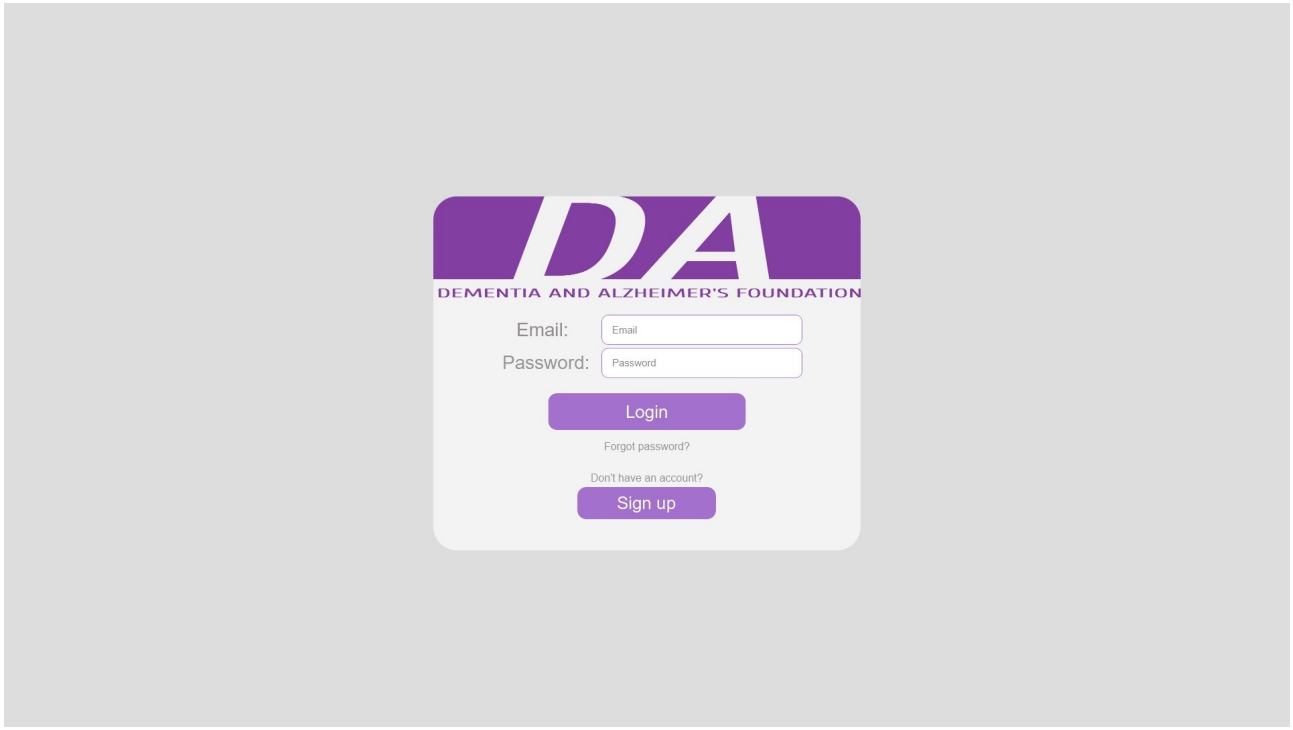
```yaml
# agents.yaml  X | # tasks.yaml X
patient_news_research_task:
  description: >
    Research the latest dementia news and developments that would be relevant
    and helpful for patients, families, and caregivers. Focus on:
    - Treatment breakthroughs and new therapies
    - Lifestyle tips and prevention strategies
    - Support resources and community programs
    - Patient success stories and hope-inspiring developments
  expected_output: >
    A json file with 10 values storing a headline,recent information as a description, images relevant to the dementia topic and sources relating to dementia research intended for patients, keeping in mind their sensitivity to harsh topics
  agent: dementia_patient_news_reporter

professional_news_research_task:
  description: >
    Research the latest dementia studies, clinical trials, and medical developments
    for healthcare professionals. Focus on:
    - Clinical research and peer-reviewed studies
    - New diagnostic tools and techniques
    - Treatment protocols and guidelines
    - Professional conferences and medical updates
  expected_output: >
    A json file with 10 values storing a headline,recent information as a description, images relevant to the dementia topic and sources relating to dementia research
  agent: dementia_professional_news_reporter
```

Sample json output:

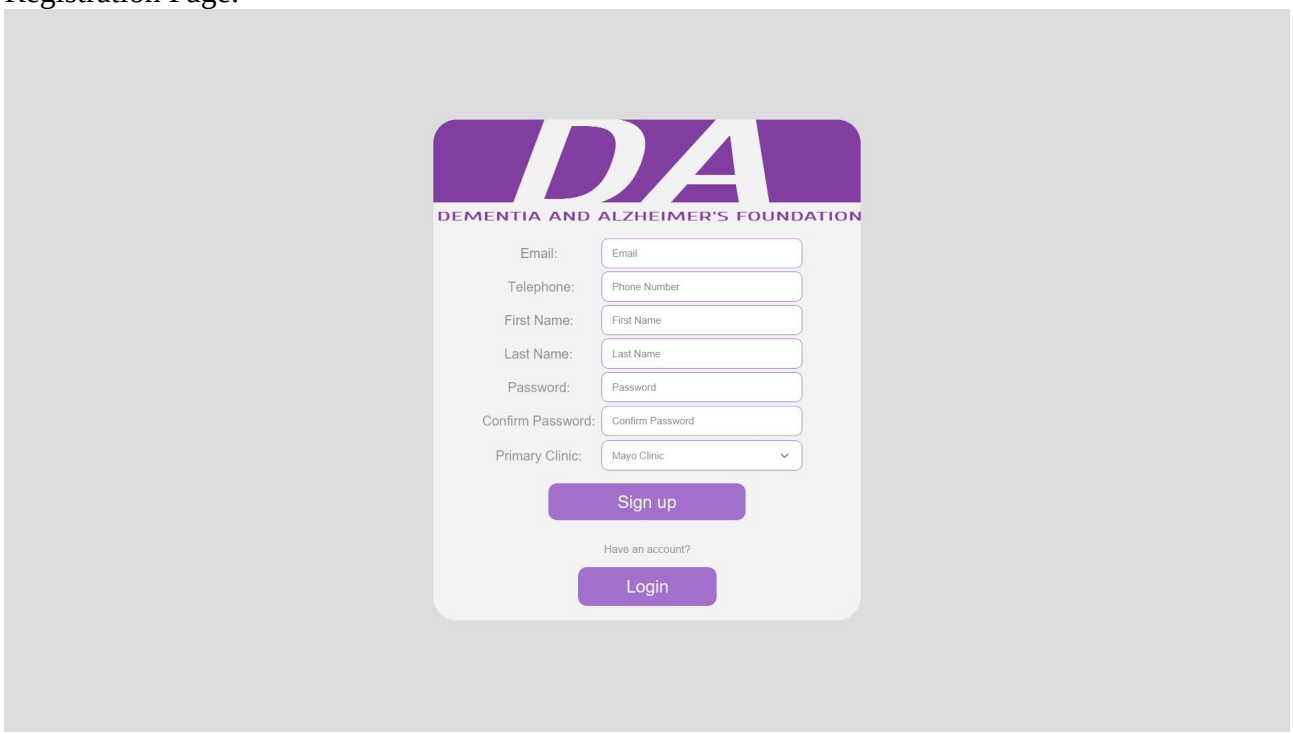
```
Final Output: ```json
{
  "dementia_news": [
    {
      "headline": "New Alzheimer's Drug Shows Promise in Slowing Cognitive Decline",
      "description": "Lecanemab, an FDA-approved treatment, has demonstrated a 27% reduction in cognitive decline for early Alzheimer's patients in clinical trials. This monoclonal antibody targets amyloid plaques in the brain and represents the first treatment to clearly slow disease progression.",
      "image": "https://images.unsplash.com/photo-1576091160399-112ba8d25d1f?ixlib=rb-4.0.3&auto=format&fit=crop&w=1000&q=80",
      "source": "New England Journal of Medicine, Alzheimer's Association"
    },
    {
      "headline": "Mediterranean Diet Linked to 23% Lower Dementia Risk",
      "description": "Recent studies show that following a Mediterranean diet rich in fruits, vegetables, whole grains, and healthy fats can significantly reduce dementia risk. The diet's anti-inflammatory properties and brain-protective nutrients appear to support cognitive health over time.",
      "image": "https://images.unsplash.com/photo-1490818387583-1baba5e638af?ixlib=rb-4.0.3&auto=format&fit=crop&w=1000&q=80",
      "source": "Journal of the American Medical Association, Neurology"
    },
    {
      "headline": "Virtual Reality Therapy Improves Quality of Life for Dementia Patients",
      "description": "New VR programs allow patients to revisit meaningful places and experiences from their past, reducing anxiety and improving mood. The technology provides cognitive stimulation while creating positive emotional connections for individuals at various stages of dementia.",
      "image": "https://images.unsplash.com/photo-1592478411213-6153e4ebc696?ixlib=rb-4.0.3&auto=format&fit=crop&w=1000&q=80",
      "source": "Alzheimer's Society, Frontiers in Aging Neuroscience"
    },
    {
      "headline": "Music Therapy Program Shows Remarkable Results in Memory Recall",
      "description": "The 'Music & Memory' initiative uses personalized playlists to help dementia patients access memories and improve communication. Participants show increased engagement, reduced agitation, and moments of clarity when listening to music from their youth.",
      "image": "https://images.unsplash.com/photo-1511379938547-c1f69419868d?ixlib=rb-4.0.3&auto=format&fit=crop&w=1000&q=80",
      "source": "Music & Memory Organization, Journal of Alzheimer's Disease"
    },
    {
      "headline": "New Caregiver Support App Provides Real-Time Assistance",
      "description": "The 'CareZare' mobile application helps family caregivers coordinate tasks, track symptoms, and access professional advice. The platform includes medication reminders, behavior tracking, and connects users with local support groups and resources.",
      "image": "https://images.unsplash.com/photo-1559757148-5c350d0d3c56?ixlib=rb-4.0.3&auto=format&fit=crop&w=1000&q=80",
      "source": "Family Caregiver Alliance, AARP"
    },
    {
      "headline": "Regular Physical Activity Shown to Protect Brain Health",
      "description": "Studies indicate that 150 minutes of moderate exercise weekly can reduce dementia risk by up to 30%. Activities like walking, swimming, and dancing improve blood flow to the brain and support the growth of new neural connections.",
      "image": "https://images.unsplash.com/photo-1571019613454-1cb2f99b2d8b?ixlib=rb-4.0.3&auto=format&fit=crop&w=1000&q=80",
      "source": "Mayo Clinic, Lancet Neurology"
    },
    {
      "headline": "Dementia-Friendly Communities Expanding Nationwide",
      "description": "Cities across the country are implementing dementia-friendly initiatives, training businesses and creating safe spaces for individuals with cognitive challenges. These programs promote inclusion and help patients maintain independence in their communities.",
      "image": "https://images.unsplash.com/photo-1477959858617-67f85cf4f1df?ixlib=rb-4.0.3&auto=format&fit=crop&w=1000&q=80",
      "source": "Dementia Friendly America, Alzheimer's Foundation"
    },
    {
      "headline": "Art Therapy Program Helps Patients Express Emotions Non-Verbally",
      "description": "The 'Memories in the Making' art program enables dementia patients to communicate through painting and drawing when words fail. Participants experience reduced anxiety and depression while creating meaningful artwork that often reveals preserved memories.",
      "image": "https://images.unsplash.com/photo-1541961017774-22349e4a1262?ixlib=rb-4.0.3&auto=format&fit=crop&w=1000&q=80",
      "source": "Alzheimer's Association, American Art Therapy Association"
    },
    {
      "headline": "New Sleep Research Reveals Connection to Dementia Prevention",
      "description": "Recent findings show that consistent, quality sleep helps clear brain toxins associated with dementia. Maintaining regular sleep schedules and addressing sleep disorders may significantly reduce Alzheimer's risk and support overall brain health.",
      "image": "https://images.unsplash.com/photo-1541781774459-bb2af2f05b55?ixlib=rb-4.0.3&auto=format&fit=crop&w=1000&q=80",
      "source": "National Institute on Aging, Sleep Research Society"
    },
```

NMS-Web – Web application login,register and dashboard

Login Page:



Registration Page:



Home page:

DEMENTIA AND ALZHEIMER'S FOUNDATION

Home | About | Services | Contact

Test ID	Patient Name	Stage One	Stage Two	Result	View

New Test

News Story 1

Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed do eiusmod tempor incididunt ut labore et dolore magna aliqua. Ut enim ad minim veniam, quis nostrud exercitation ullamco laboris nisi ut aliquip ex ea commodo consequat.

News Story 2

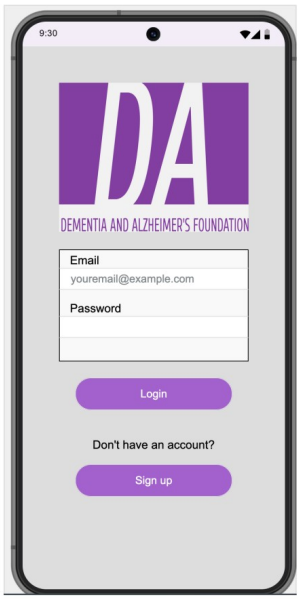
Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed do eiusmod tempor incididunt ut labore et dolore magna aliqua. Ut enim ad minim veniam, quis nostrud exercitation ullamco laboris nisi ut aliquip ex ea commodo consequat.

News Story 3

Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed do eiusmod tempor incididunt ut labore et dolore magna aliqua. Ut enim ad minim veniam, quis nostrud exercitation ullamco laboris nisi ut aliquip ex ea commodo consequat.

NMS-Mobile – Mobile application login,register, dashboard and test questions

Login



Registration
1

2