TELL US ABOUT YOURSELF

Well first of all thank you very much for giving me the opportunity to be interviewed for this position with your company today. My name is Phogole Trishad, and I just completed my honours degree in computer science from the University of Limpopo. I would describe myself as a dedicated and results-driven individual with a strong academic foundation. I am also a very hardworking person with strong personality

Throughout my studies, I have had the privilege of working on various projects and I believe my academic background and hands-on experience have equipped me with the skills to excel in this role. I am someone who have strong analytical and problem-solving skills, and also highly adaptable and flexible, which allows me to quickly learn and apply new technologies or technologies.

I am also passionate about leveraging data and technology to solve complex, real-world problems, and I am also passionate about contributing my knowledge and skills to drive innovation.

Beyond academics, I actively participate in coding hackathons and enjoy playing football, which has further developed my teamwork and communication skills. If selected, I am committed to ensure that my contributions will have a meaningful and valuable impact on your company.

Why should we hire you?  
I bring strong analytical and problem-solving skills, and I am confident that my combination of technical skills, problem-solving abilities, and eagerness to learn makes me a strong fit for this position. I would love the opportunity to contribute and grow within your team.

Why would you like to join the HSCR?

I am excited about the opportunity to join your organisation because it aligns with my passion for using technology to drive meaningful social impact.

Being part of a research-focused organization like yours would allow me to also work alongside experts, learn from them, and continue growing in my field. I’m particularly eager to gain more experience in my field, and I believe that your organisation offers an environment TO enhance my academic and professional growth.

Tell us about your Honours research project?

My Honours research project **focused** on optimising resource allocation and scheduling in 5G networks using **Mobile Edge Computing**. I developed/ implemented and analysed a **Q-learning-based PSO strategy**, comparing it with fuzzy allocation and game theory approaches. The goal was to **minimize system energy consumption, reduce delay, and optimise throughput (the rate at which data or tasks are successfully processed and transmitted in a system over a given period**. My findings showed that the proposed strategy outperformed others in terms of efficiency and cost-effectiveness. The project involved MATLAB simulations. All this was simulated within a MATLAB simulation platform

**5G Networks**

Managing resources in **5G is challenging** due to the high demand for low-latency (Speed at which data is processed) and high-bandwidth applications.

**Optimizing**

* This refers to **improving efficiency** in how resources (e.g., bandwidth, CPU power, storage) are managed in 5G networks.

**Resource Allocation**

* Resource allocation involves assigning theseresources effectively to maximize performance while avoiding congestion and delays in 5G networks

**Scheduling**

* Scheduling refers to **prioritizing and managing tasks** to ensure they are executed efficiently.

**Using Mobile Edge Computing (MEC)**

* **MEC extends cloud computing to the network edge**, bringing computation closer to users to reduce delay and improve efficiency.

Instead of sending all data to a central cloud, **MEC allows computing to be done at base stations or edge servers**, which speeds up processing and reduces network congestion.

**Web Security Attacks Analysis**

The goal of this project is to analyse web security vulnerabilities through hands-on attack simulations, assess their impact, and implement countermeasures to enhance web application security.

Used tools like **Nikto** for web vulnerability scanner and **Burp Suite** to analyse attack behaviour. **SQLMap:** Detects and exploits SQL Injection vulnerabilities.

**Damn Vulnerable Web Application (DVWA):** A deliberately insecure application for practicing attacks.

**Deployed Countermeasures**

* + **Penetration testing (IDENTIFY SECURITY FLAWS)**

Is a cybersecurity practice where ethical hackers simulate real-world cyberattacks on a system, network, or application to identify vulnerabilities before malicious attackers can exploit them.

* + Deployed **Web Application Firewalls (WAF)** to block malicious traffic.

**Steps to Deploy a WAF**

**1. Choose a WAF Solution**

**Cloudflare WAF**

**Examined Attack Techniques**

SQL Injection

Cross-Site Scripting

DDoS (Denial of Service Attack) attack

Tell us about your projects, what role you played in those projects if it was a group project

For the Mankweng Hospital Maintenance App, I was responsible for the back-end development. This was a group project aimed at improving the hospital's maintenance request system by streamlining communication between hospital staff and maintenance teams.

**Database Management:** Designed and implemented a secure database to **store maintenance requests**, user profiles, and task status updates. **Cloud Databases** – Hosted on cloud platforms for scalability (e.g., **Google Firebase**).

**Security Implementation:** Ensured data security by implementing authentication and authorization mechanisms.

Understand the Certifications on your CV

**Why is Cybersecurity Important?**

With the rise of digital transformation, cyber threats have evolved, targeting sensitive data, financial assets, and critical infrastructure. A successful cyberattack can result in data breaches, financial losses, reputational damage, and even national security threats. Cybersecurity ensures the confidentiality, integrity, and availability (CIA) of information, protecting users and organizations from malicious activities.

**Key Cybersecurity Concepts**

1. **Confidentiality** – Ensuring that sensitive information is only accessible to authorized users.
2. **Integrity** – Protecting data from being altered or tampered with.
3. **Availability** – Ensuring that information and systems are accessible when needed.

**Types of Cyber Threats**

* **Malware** – Malicious software such as viruses, worms, ransomware, and spyware.
* **Phishing** – Deceptive attempts to steal sensitive information through fake emails or websites.
* **Denial of Service (DoS) & Distributed Denial of Service (DDoS) Attacks** – Overloading a system to disrupt its functionality.
* **Man-in-the-Middle (MitM) Attacks** – Intercepting communications to steal or alter information.
* **SQL Injection** – Exploiting database vulnerabilities to manipulate or steal data.

**Cybersecurity Measures**

* **Strong Passwords & Multi-Factor Authentication (MFA)** – Enhancing security for user accounts.
* **Firewalls & Antivirus Software** – Blocking unauthorized access and detecting malware.
* **Data Encryption** – Securing information by converting it into an unreadable format.
* **Regular Software Updates & Patch Management** – Fixing security vulnerabilities in systems.
* **Cybersecurity Awareness & Training** – Educating users to recognize and prevent cyber threats.

What are you passionate about?

I am passionate about using technology to solve real-world problems. Everything now is about AI, and I like to stay up to date with emerging technologies.

What are your goals for the future?

My goal is to expand my knowledge in my field, step into leadership positions within my field, and play a key role in developing innovative solutions that address real-world challenges.

How do you handle stress and pressure?

I manage stress by staying organized and prioritizing tasks effectively. I also take short breaks to refocus, which helps me maintain productivity under pressure.

What motivates you?

I want to see my work out there one day being celebrated. I want to be known as someone who played a major role in the society.

Where do you see yourself in 5 years?

“In five years, I see myself becoming an expert in my field, taking on leadership responsibilities and contributing to innovative projects that address real-world challenges.

Can you tell me about a difficult work situation or project and how you overcame it?

During my honours research, I encountered difficulties in simulating my results due to unexpected system errors and inconsistencies in my system. But at the end of the day I managed to get it to work, through consultation with my supervisor and with the help of internet resources.

What is your biggest weakness?  
I tend to focus a lot on making sure everything is perfect, which can sometimes slow me down. However, I've learned to balance my perfection and efficiency by prioritizing tasks.

What are your biggest strengths?

I have strong analytical and problem-solving skills, especially in working with data. I’m also highly adaptable and flexible, which allows me to quickly learn and apply new technologies or technologies.

Project Management

Is the process of **planning**, **organizing**, **executing**, and **supervising** a project to achieve specific goals:

To ensures that projects align with business goals, meet technical requirements, and are completed on schedule and within budget.

e.g. **Developing a Mobile Banking App**

**Project Phases:**

* **Initiation:** This is the starting phase where the purpose of the project is defined. This is where we need to understand what the user needs, the goals of the project and the objectives.
* **Planning:** In this phase, the details of the project are worked out. This includes setting technical requirements (what the project needs to do), choosing the tools and technology to use, and creating a timeline for when each part of the project will be completed.

Define technical requirements, select development tools, set timeline.

* **Execution:** This is where the actual work happens. Developers start building the product (like an app), write code, and test it. Security features are also added to make sure the product is safe to use.

Developers create and test the app, integrate security features.

* **Monitoring & Controlling:** During this phase, the project is kept on track. The team fixes any issues, like bugs, and makes sure everything is running well. They also check that the project meets security standards and that everything is functioning as expected.

Fix bugs, optimize performance, ensure security compliance.

* **Closure:** This phase involves completing the project. The final product (like the app) is deployed for users to use. The team also trains users on how to use the product and provides ongoing support and maintenance to fix any future issues.

Deploy app, train users, provide maintenance support.

**Troubleshooting**

Is the process of identifying, diagnosing, and resolving problems or issues in a system, device, software, or process. It involves systematically analysing the issue, determining the root cause, and applying a solution to restore functionality.

**Steps in Troubleshooting:**

1. **Identify the Problem –** Gather information about the issue, symptoms, and any error messages.
2. **Understand the Cause –** Check logs, run diagnostics, and isolate potential causes.
3. **Develop a Plan –** Consider different solutions and their potential impact.
4. **Document the Solution –** Keep a record of the issue and fix for future reference.

**Data Analysis vs Business Intelligence (BI)**

While both data analysis and business intelligence (BI) are concerned with **understanding and interpreting data** to **help organizations make better decisions**, they differ in scope, methods, and objectives**. Here's a breakdown of the key differences:**

**1. Purpose:**

**Data Analysis:** The goal of data analysis is to examine raw data to find meaningful patterns, trends, and relationships. **Data analysis** is typically focused on understanding past events to draw conclusions or make predictions about the future.

**Example 1:**

* **Scenario:** A teacher wants to understand how students' exam scores are related to the number of hours they studied.
* **Data Analysis:** The teacher collects data on student study hours and exam scores, then uses **correlation analysis** to see if there's a relationship. They might use a **scatter plot** or **regression analysis** to predict future exam scores based on study hours.

**Example 1: Analysing Sales Trends**

* **Scenario:** A car dealership wants to understand how car sales vary throughout the year.
* **Data Analysis:** The dealership collects sales data from the past few years, including the number of cars sold each month. Using **time-series analysis**, they identify seasonal trends (e.g., more cars sold during holiday seasons or after new model releases).
  + They might plot the data on a **line graph** to show how sales increase or decrease over time and use **moving averages** to smooth out fluctuations and identify underlying patterns.

**Networking in the context of computer science and IT** refers to the **practice of connecting computers, servers, devices,** and **other hardware** together to **share resources and enable communication over a network.**

It involves the design, implementation, management, and maintenance of **these connections to ensure reliable and efficient communication within a system or between systems**. Networking can be categorized into several components and concepts:

**Key Aspects of Networking:**

1. **Types of Networks:**
   * **Local Area Network (LAN):** A network that connects devices within a small area, like an office or home.
   * **Wide Area Network (WAN):** A network that spans a large geographical area, such as the internet.
   * **Wireless Networks (Wi-Fi):** Networks that connect devices wirelessly using radio waves.
   * **Virtual Private Network (VPN):** A network that provides secure remote access to a LAN over the internet.
2. **Protocols:**
   * **Transmission Control Protocol (TCP):** A protocol that ensures reliable communication by breaking down data into packets and reassembling them in order.
   * **Internet Protocol (IP):** A set of rules that determine how data is sent from one device to another over the internet.
   * **Hypertext Transfer Protocol (HTTP):** The protocol used for transferring web pages over the internet.
   * **File Transfer Protocol (FTP):** A protocol used for transferring files between devices.
3. **Networking Devices:**
   * **Routers:** Devices that direct data packets between different networks, such as between a local network and the internet.
   * **Switches:** Devices that connect multiple devices within a LAN and manage the flow of data between them.
   * **Firewalls:** Devices that protect networks by monitoring and controlling incoming and outgoing traffic based on predetermined security rules.
4. **IP Addressing:**
   * Every device on a network is assigned an **IP address**, a unique identifier that allows it to communicate with other devices. IP addresses are essential for routing data across networks.
5. **Network Security:**
   * Networking also involves **securing** data as it moves through networks. This can include **encryption**, **firewalls**, **antivirus software**, and **intrusion detection systems** to protect data from unauthorized access or attacks.

**Example of Networking in Action:**

* When you access a website, your computer sends a request to a **web server** over the internet. This involves multiple networking devices like **routers** and **switches** that route data between different networks, ensuring the website's data is delivered to your browser.

**Business Intelligence (BI):**

Refers to the technology-driven processes, tools and techniques used to collect, analyse, and prevent data in a meaningful way to help organisations make informed business decisions. BI focuses on providing business leaders with **historical, current, and predictive views of data** to improve decision-making**. BI** tools focus on **reporting, monitoring, and dashboarding** for easy access to key metrics, rather than deeper statistical analysis.

**EXAMPLE:**

**Scenario:** A small restaurant owner wants to track how much money they make each day and which dishes are most popular.

**BI:** The owner uses a **BI tool** to create a simple report that shows sales figures, customer ratings of dishes, and the most ordered items. The report is updated automatically and is easy to read, helping the owner make decisions about menu changes or promotions.

**Explain a time when you had to debug or optimize a piece of code. How did you approach it, and what was the result?**

* This goes back to my Honours degree Research Project

**How do you ensure that your code is ethical, secure, and reliable, especially when dealing with sensitive data?**

**Ethical Practices**: Ensure transparency and respect user privacy (clear consent mechanisms).

**Security**: Use encryption, secure authentication, hashing techniques, and strong access controls.

**Reliability**: Write tests, handle errors securely, and perform code reviews.

**Compliance**: Follow regulations like GDPR or HIPAA for data protection.

**Ongoing Monitoring**: Regularly audit and monitor your code for security vulnerabilities.

**What role do you think artificial intelligence and machine learning will play in the future of research and development?**

**Artificial Intelligence (AI) and Machine Learning (ML)** are set to revolutionize Research and Development (R&D) by accelerating discovery, enhancing data-driven decision-making, automating tasks, and improving collaboration. These technologies can significantly speed up the innovation process by analysing large datasets, predicting outcomes, and uncovering insights that would be difficult for humans to detect. AI also fosters personalized solutions, particularly in fields like healthcare, and improves efficiency by automating repetitive tasks.

**What programming languages are you proficient in**

Mention the programming languages you are familiar with (Java, C++)

**Java Simple Project Examples:**

**Project:** **Number Guessing Game**

1. **Project:** **Simple Calculator**

**C++ Simple Project Examples:**

1. **Project:** **ATM Machine Simulation**
   * **Description:** A program that simulates basic ATM functions like checking balance, depositing money, and withdrawing money.
2. **Project:**  **Temperature Converter**

* **Description:** A program that converts temperatures between Celsius and Fahrenheit.

**Data Structures and Algorithms (DSA) – Simple Explanation**

🔹 **Data Structures** are ways to organize and store data efficiently so that it can be used effectively. Examples include:

* **Arrays** – Like a list of items (e.g., a shopping list).
* **Linked Lists** – Like a chain where each piece is connected to the next.
* **Stacks** – Like a stack of plates (Last In, First Out).
* **Queues** – Like a line at a ticket counter (First In, First Out).
* **Trees** – Like a family tree with branches.
* **Graphs** – Like a map with cities connected by roads.

🔹 **Algorithms** are step-by-step instructions for solving problems efficiently. Examples include:

* **Sorting Algorithms** – Arranging data in order (e.g., Bubble Sort, Quick Sort).
* **Searching Algorithms** – Finding an item in a list (e.g., Binary Search).
* **Pathfinding Algorithms** – Finding the shortest route (e.g., Dijkstra’s Algorithm).

**Computer Architecture – Simple Explanation**

**Computer Architecture** refers to how a computer is designed and how its components work together to process data. It’s like the blueprint of a computer system.

**Main Components:**

1. **Central Processing Unit (CPU) – "The Brain"** 🧠
   * Executes instructions and processes data.
   * Has components like:
     + **Control Unit (CU)** – Directs operations.
     + **Arithmetic Logic Unit (ALU)** – Performs calculations.
     + **Registers** – Store temporary data.
2. **Memory (RAM) – "Short-term Memory"** 🗂️
   * Temporarily holds data and instructions while the CPU is working.
   * Faster than storage but loses data when the power is off.
3. **Storage – "Long-term Memory"** 💾
   * Hard drives (HDD/SSD) store data permanently.
4. **Input & Output Devices – "Communication System"** ⌨️🖥️
   * Input: Keyboard, mouse, sensors.
   * Output: Monitor, printer, speakers.
5. **Buses – "Data Highways"** 🚍
   * Transfer data between components.