PRACTICAL - 3

AIM: Create a model, define system architecture, and identify and mitigate potential threats using Microsoft Threat Modeling Tool.

Solution:

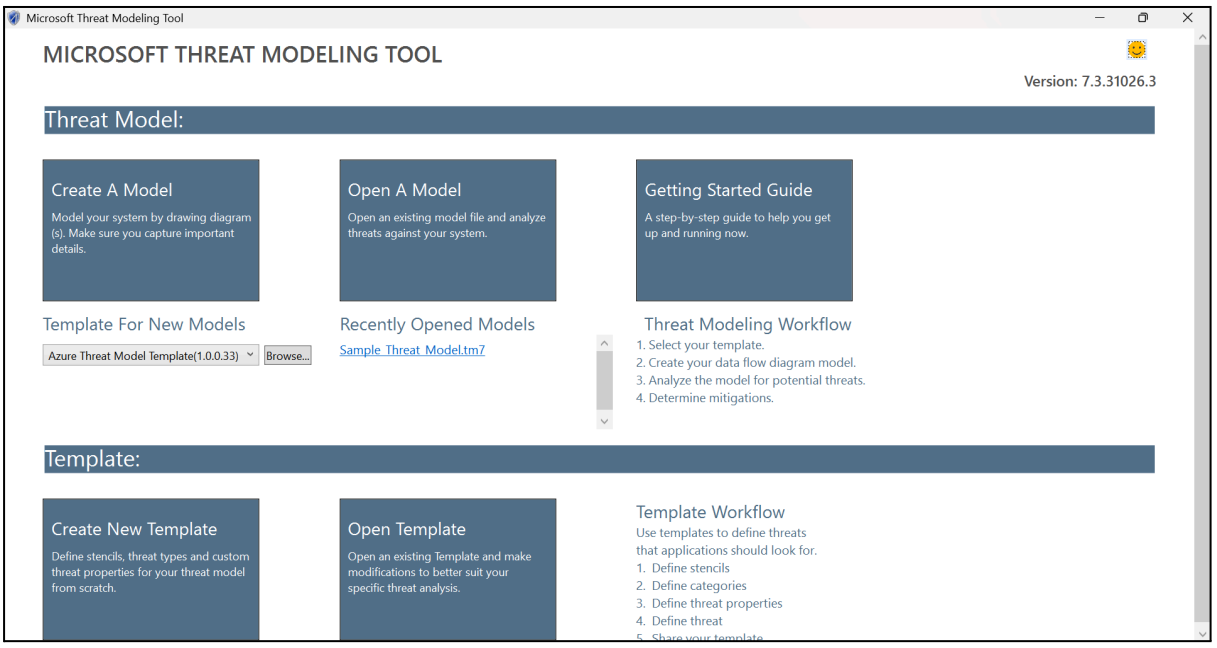
Introduction

Threat modeling is a proactive security practice that helps identify potential risks and vulnerabilities in software architecture during the design phase. Microsoft Threat Modeling Tool provides a graphical interface to model a system using **Data Flow Diagrams (DFDs)** and **automatically generates threat insights** using the **STRIDE** methodology.

Procedure

Step 1: Tool Setup and Model Creation

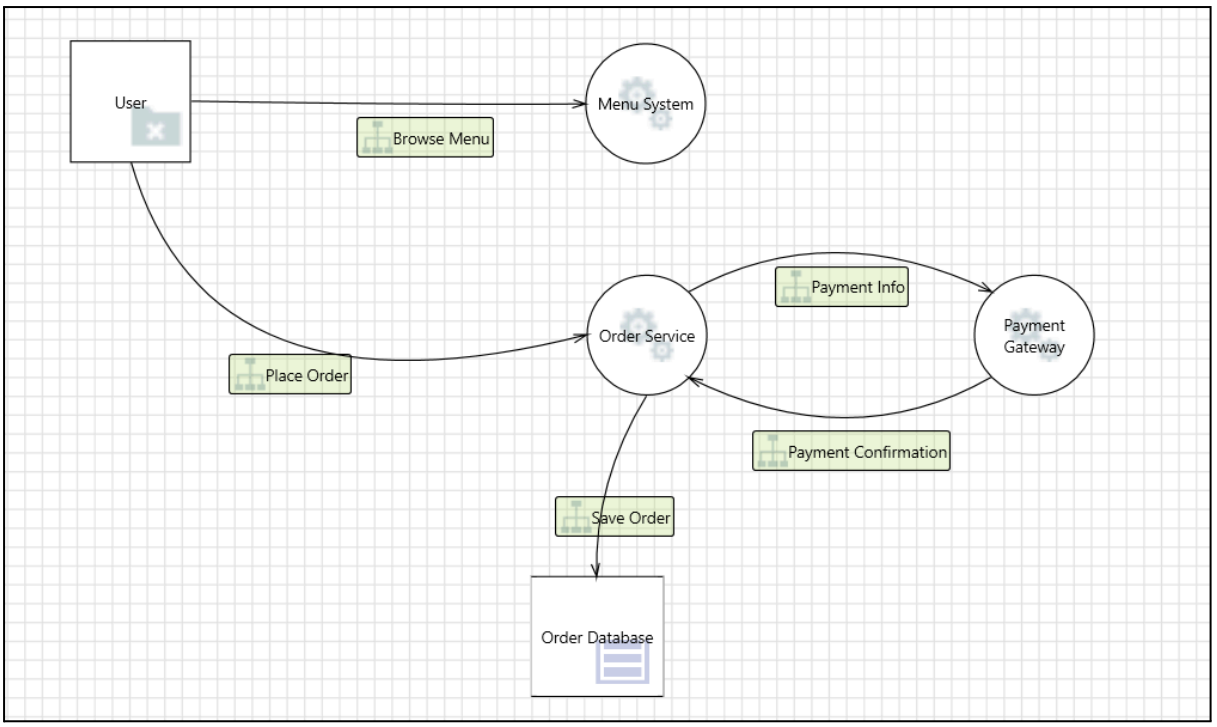
The Microsoft Threat Modeling Tool was installed and launched on a Windows system. A new model was created for an **Online Food Ordering System**.



Step 2: Define System Architecture

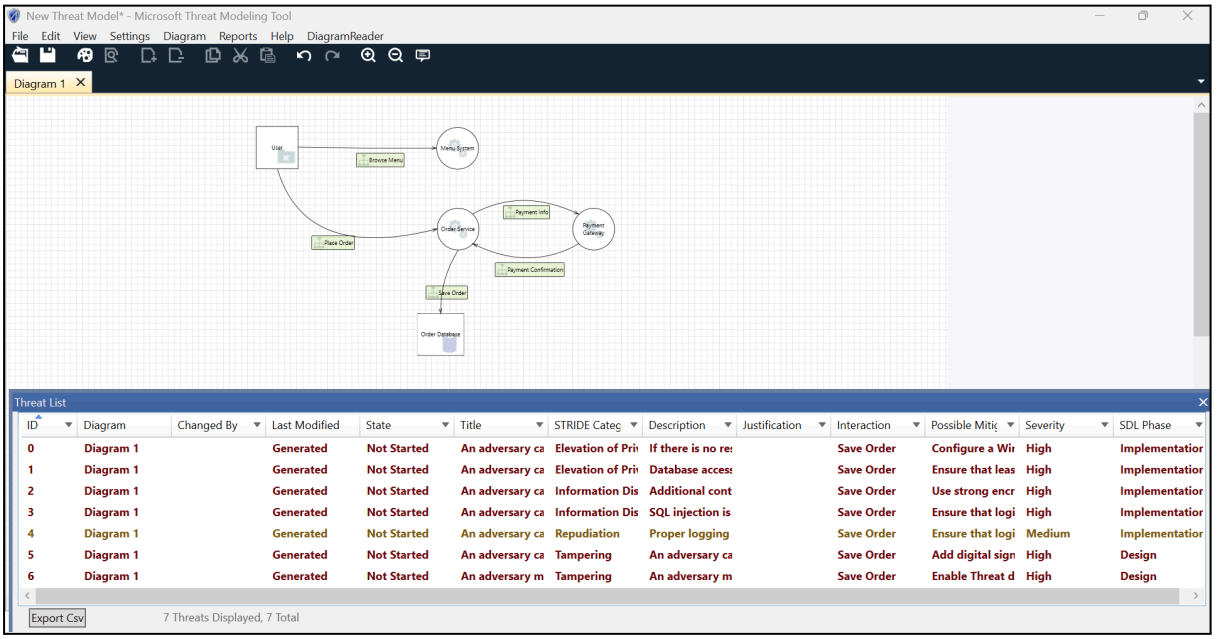
The architecture of the system was modeled using a Data Flow Diagram (DFD). The following components were added:

- **External Interactor:** User
- **Processes:** Menu System, Order Service, Payment Gateway
- **Data Store:** Order Database
- **Data Flows:**
    - User to Menu System (request/view food)
    - User to Order Service (submit order)
    - Order Service to Payment Gateway (payment request)
    - Order Service to Order Database (store order history)



Step 3: Generate and Review Threats

Using the built-in STRIDE model, Microsoft Threat Modeling Tool automatically identified potential threats related to each component and data flow. Each threat was categorized, described and reviewed for possible mitigation strategies.



Threats Identified

Component	Threat Type	Description	Suggested Mitigation
Tampering	Order data can be modified during transmission	Data flow: User → Order Service	Use HTTPS and message integrity checks
Information Disclosure	Payment information may be exposed to third parties	Data flow: Order Service → Payment Gateway	Encrypt sensitive data during transmission
Elevation of Privilege	Attacker may gain access to admin functionalities	Order Service	Apply role-based access control (RBAC)
Repudiation	User may deny placing an order without evidence	Order Database	Implement proper logging and audit trails

Mitigation Recommendations

To address the identified threats in the Online Food Ordering System, the following security measures are recommended:

- Secure all communications with TLS/SSL to prevent data tampering or exposure
- Use encrypted storage for sensitive information in databases
- Implement access controls to prevent privilege escalation
- Enable activity logging for sensitive operations to support auditability
- Sanitize and validate all inputs from users to prevent malicious data injection