Executive Summary: In-port Watch Standing Scheduler for Personnel

To: LTC Smith

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Subject: Report on the Development of the In-port Watch Standing Scheduler for personnel

1. Introduction

The manual scheduling of personnel for watch duties in a dynamic naval environment is a complex and time-consuming administrative task. The process is prone to human error, which can lead to unfair duty distribution, violations of mandatory rest periods, and scheduling conflicts with personnel leave. This project set out to create a robust, standalone desktop application that automates and simplifies the entire personnel and shift management process.

2. Solution Overview

The watch-standing scheduler developed in this project is a custom-built graphical user interface (GUI) application in Python. It provides a comprehensive solution for managing naval personnel and their duties through three integrated modules:

* **Personnel Manager:** A centralized system for creating, updating, and maintaining detailed crew records. All data is persistently stored in a local personnel.csv file.
* **Leave Manager:** An interface for logging, tracking, and editing different types of leave, ensuring that absences are automatically excluded from scheduling availability.
* **Shifts Manager:** The core module, which automates monthly watch schedules. It incorporates ship status (in-port or at-sea), holidays, and individual preferences or unavailability.

3. Implementation Details

The application was built with a stack of reliable, well-established technologies. The GUI was developed using Tkinter, Python’s standard graphical interface library. Data handling is managed by the pandas library, which supports both .csv and Microsoft Excel files.

At its core, the scheduling engine uses a rule-based algorithm that systematically assigns duties while enforcing key constraints, such as:

* Per-rank monthly duty ceilings
* A mandatory two-day gap between consecutive duties for each individual
* Limits on weekend and holiday assignments per person
* Role-specific restrictions, such as duties limited to weekdays only

4. Project Outcomes

Implementation of the watch-standing scheduler yields several significant benefits:

Automation and Efficiency: Reduces the time required to create a monthly schedule from hours to minutes.

* **Automation & Efficiency:** Cuts schedule creation time from hours to minutes.
* **Accuracy & Rule Enforcement:** Eliminates scheduling errors by programmatically enforcing all predefined constraints.
* **Enhanced Fairness:** Distributes duties equitably by rank, ensuring a balanced workload across the crew.
* **Data Management & Reporting:** Maintains a reliable personnel and leave database and outputs polished monthly schedules and statistical summaries in Excel for easy dissemination.

5. Challenges and Lessons Learned

One of the main challenges in development was **internationalization (i18n)**, since the application had to be translated from Greek to English. This highlighted the need to separate user-facing text from the internal data the system depends on. For example, ranks and duties could be translated, but certain values — like the shift acronyms ΑΦ and ΥΦ in the personnel.csv file — needed to stay in Greek so the scheduling logic would still work. To solve this, we improved how data was managed and ensured all files used consistent encoding (UTF-8-SIG). ---

6. Conclusion

An early implementation of the personnel watch-standing scheduler was completed, and it achieved several of its main objectives. It improves the efficiency and accuracy of duty scheduling and supports fairness of watch-standing assignments. Although not all goals were fully achieved and user-friendliness can be further improved, this tool provides a solid foundation for continued development.