SREC/Qt/XML/Batch Practical Roadmap (Exercises Only)

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1 Module 1: SREC File Format

1.1 Key Concepts

- Motorola S-record structure
- Checksum validation rules
- Common record types (S0-S9)

1.2 Practical Exercises

1. Implement a C++ function to extract the address field from S1/S2/S3 records:

```
uint32_t extractSRecAddress(const std::string& line)
    ↪ {
    // Complete this function
}
```

2. Write a program that detects invalid SREC checksums without correcting them.

2 Module 2: Qt Integration

2.1 Core Skills

- Qt file handling (QFile, QTextStream)
- Model-View architecture
- Signal/Slot connections

2.2 Hands-On Tasks

1. Create a Qt widget that:
   - Displays SREC records in a QTableView
   - Highlights lines with checksum errors in red
   - Shows record statistics in a status bar
2. Optimize this Qt file loader snippet:

```
void loadS19File(const QString& path) {
    // Identify and fix potential issues
}
```

3 Module 3: XML Configuration

3.1 Learning Objectives

- XML DOM vs. SAX parsing
- Qt XML modules comparison
- Configuration file design

3.2 Implementation Challenges

1. Design an XML schema for storing:
   - Recent SREC file paths
   - UI window geometry
   - Validation preferences
2. Implement a Qt class to manage these settings.

4 Module 4: Batch Automation

4.1 Key Topics

- Windows batch scripting
- Build automation
- Error handling in .bat files

4.2 Scripting Tasks

1. Create a batch script that:
    - Compiles the Qt project
    - Runs unit tests
    - Packages the application
2. Add error checking to prevent:
    - Running without Qt in PATH
    - Continuing after build failures

5 Capstone Project

Develop a complete SREC toolkit with:

- Graphical viewer with search/filter
- Configurable validation rules
- One-click build/deploy system
- XML-based plugin architecture