



# Benchmarking Hardware for Accelerating Intelligence and Security Graph Problems

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**Project Github:** <https://github.com/UMD-ARLIS/Graph-Benchmarking-Project>

**ReadTheDocs:** <https://graph-benchmarking.readthedocs.io/en/latest/>

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## Abstract

## 1 Introduction

The purpose of this technical report is to describe the design and implementation of the *ARLIS Graph Hardware Acceleration Benchmark* (AGHAB). A recent analysis of the computing requirements of the United States (US) intelligence and Security (I&S) community shows that many of the core analytic problems are formulated as graph processing problems <empty citation>

## 2 Benchmark Architecture

## 3 Benchmark Data

## 4 Reference Implementations

### 4.1 Requirements

### 4.2 Problem Domains

#### 4.2.1 Community Detection

#### 4.2.2 Subgraph Matching

### 4.3 Reference Implementations

#### 4.3.1 Louvain Algorithm

#### 4.3.2 VF3

## 5 Telemetry

## 6 Benchmarking Example

## 7 Contributing

## 8 References

## 9 Glossary

**ARLIS** Applied Research Laboratory for Intelligence and Security.

**BFS** Breadth-First Search

**CPU** Central Processing Unit

**DARPA** Defense Advanced Research Projects Agency

**GPU** Graphics Processing Unit

**HIVE** Hierarchical Identify Verify Exploit

**KGA** Knowledge Graph Analytics

**PIUMA** Programmable Integrated Unified Memory Architecture

**SGM** Sub Graph Matching

**TEPS** Traversed Edges Per Second

**TEPS/W** Traversed Edges Per Second Per Watt