Architectural Audit & Strategic Modernization Report: Project "Honey Scan" Refactoring

1. Executive Summary

1.1. Engagement Mandate and Scope

This extensive architectural research report serves as the definitive technical standard for the modernization, refactoring, and internationalization of the "Honey Scan" deceptive security platform. Commissioned under the directive of a Senior Principal Software Architect and Security Engineer, this document provides a rigorous evaluation of the transition from the legacy "HFish" baseline—a Go-based, regionally locked honeypot system—to a globally standardized, high-performance distributed sensor network.

The scope of this engagement is defined by three critical pillars:

1. **De-Localization & Sanitation:** The systematic identification and excision of all hardcoded Chinese ("CN") logic, domestic hardware dependencies, and region-specific integration vectors (e.g., WeChat/DingTalk) to establish a strictly English-native, internationalized codebase.
2. **Architectural Arbitration (The Performance Dilemma):** A critical evaluation of the stakeholder's hypothesis regarding porting the core backend from Go (Golang) to PHP/Python. Based on deep-dive performance modeling of high-concurrency network listening, this report issues a formal, evidence-based **VETO** against a full migration to interpreted languages for the core listener engine, proposing instead a specialized Hybrid Architecture.
3. **Strategic Implementation Roadmap:** The definition of a phased, risk-mitigated implementation path that ensures zero regression in detection capabilities while maximizing throughput, maintainability, and extensibility.

1.2. Provenance and Data Integrity

The analysis leverages a forensic examination of the baseline repository (hacklcx/HFish) and the target state specifications derived from the provided derlemue/honey-scan documentation. It is critical to note that at the time of this audit, the live derlemue/honey-scan repository was technically inaccessible via standard public crawling methods. Consequently, pursuant to the fallback protocols defined in the engagement mandate, the target state analysis relies on the detailed architectural descriptions found in the attached research reports (Honey-Scan Report 1 & 2). This has necessitated a reconciliation strategy that

merges the concrete codebase of HFish with the functional specifications of Honey-Scan.

1.3. The Performance Verdict (Executive Preview)

The architectural analysis confirms that the "HFish" baseline derives its enterprise-grade performance characteristics fundamentally from its Go (Golang) implementation. Go's goroutine scheduling, low memory footprint (~2KB per routine), and non-blocking I/O model allow the system to handle 10,000+ concurrent connections with minimal resource consumption.[1]

By contrast, the proposed migration of the *listener core* to PHP or Python introduces severe, non-negotiable bottlenecks:

- **Python:** Constrained by the Global Interpreter Lock (GIL), creating significant latency in high-throughput CPU-bound scenarios essential for packet inspection and signature matching.[1]
- **PHP:** Traditionally reliant on a request-per-process model (PHP-FPM) ill-suited for persistent TCP socket listening. While asynchronous extensions like Swoole exist, they introduce significant complexity and memory management risks unsuitable for stability-critical security sensors.[3]

Architectural Decision: The core networking engine **must remain in Go** to maintain resilience against automated botnet floods. However, the architecture will be decoupled to utilize **PHP for the Management UI** (leveraging its robust web frameworks and ease of modification) and **Python for the Analysis Engine** (leveraging its superior data science and regex capabilities), resulting in a "Best-of-Breed" Hybrid Stack.

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2. Forensic Baseline Analysis: The HFish Architecture

To successfully refactor the target, we must first anatomize the baseline. The HFish repository [4] represents a mature, albeit regionally locked, deception platform developed by Beijing ThreatBook Online Technology Co., Ltd. Its architecture is specific, opinionated, and tailored for the Chinese intranet security market ("Xinchuang").

2.1. System Topology: The Distributed B/S Model

HFish employs a classic Browser/Server (B/S) architecture designed for distributed deployment. This topology is critical to preserve during the refactoring to ensure scalability and separation of concerns.

2.1.1. The Management Node (Server)

- **Role:** The "Brain" or Control Plane. It handles data aggregation, visualization, node management, and alerting.

- **Current State:** A monolithic Go binary serving a web frontend. It exposes an RPC interface for nodes to report telemetry.
- **Critical Dependency:** It acts as the central command for all distributed probes. In the current architecture, if the Management Node fails, alert ingress stops, although individual nodes may continue to absorb traffic blindly.
- **Localization Impact:** The Management Node is the primary residence of the user interface (UI) and configuration logic, making it the focal point for the "De-Sinicization" effort.

2.1.2. The Leaf Node (Client)

- **Role:** The "Sensor" or Data Plane. These are lightweight agents deployed across the network (Intranet/Extranet).
- **Function:** They bind to specific ports (e.g., 22, 80, 3306, 6379) to simulate vulnerable services.
- **Mechanism:** Crucially, HFish nodes are designed to be "dumb." They do not process data locally; they forward raw interaction telemetry to the Management Node via encrypted RPC or API tunnels.[5] This design minimizes the resource footprint on the sensor, allowing it to run on low-power hardware (IoT devices, Raspberry Pis).
- **Service Simulation:** HFish supports over 90 distinct services [4], ranging from generic protocols (SSH, FTP, Telnet) to vendor-specific applications common in Asia (e.g., generic OA systems, specific versions of MySQL/Redis).

2.2. The "CN" Logic: Anatomy of Localization Debt

A significant portion of the refactoring effort involves identifying and excising "CN" (Chinese) logic. This goes beyond simple string translation; it involves deep architectural dependencies on the Chinese software ecosystem, regulatory compliance standards, and domestic hardware optimizations.

2.2.1. Hardcoded Alerting Integrations

The current codebase [6] includes hardcoded drivers for Chinese enterprise communication platforms. These integrations are often deeply embedded in the alerting pipeline (pkg/alert) rather than being modular plugins.

- **Enterprise WeChat (WeCom):** Uses specific Tencent API structures for webhook callbacks. The authentication flow and message formatting are proprietary to the WeCom ecosystem.
- **DingTalk (Alibaba):** Deeply integrated for DevOps alerting in Chinese markets. It uses a specific signing secret mechanism for webhook validation that is non-standard outside of Alibaba's ecosystem.
- **Feishu (Lark):** ByteDance's collaboration tool integration. While Lark is the international version, the implementation likely defaults to the feishu.cn API endpoints.

Refactoring Implication: These must be abstracted into a generic NotificationProvider interface. The refactored system should support standard Webhooks (Slack, Discord, Teams) and standard SMTP email via a configurable driver system, removing the vendor-specific hardcoding.

2.2.2. Domestic Hardware & OS Abstractions

HFish was optimized for "Xinchuang" initiatives, which mandate compatibility with Chinese-developed hardware.[4]

- **CPU Architectures:** The build pipeline includes targets for **Loongson** (MIPS64-based), **ShenWei** (Alpha-derived), and **Kunpeng** (ARM64-based). While ARM64 support is valuable globally, the specific compiler flags and optimizations for Loongson/ShenWei represent technical debt for a western-focused fork.
- **Operating Systems:** Specific checks and file path adjustments likely exist for domestic Linux distributions like **Kylin**, **Deepin**, or **UOS**. These often deviate from the Filesystem Hierarchy Standard (FHS) used by Debian/RHEL.

Refactoring Implication: Simplify the build pipeline to focus on standard amd64 and arm64 architectures for Linux and Windows (Docker-first strategy). Remove conditional logic catering to obscure domestic hardware unless strictly POSIX-compliant.

2.2.3. IP and Location Libraries

The baseline relies on Chinese-centric IP databases for geolocation, which often lack accuracy for non-Chinese IP space and return data in GBK encoding.

- **QQWry.dat (Chunzhen):** A legacy, widely used IP database in China.[8] It is a binary format that requires a specific decoder. It is notorious for having very granular data for Chinese ISPs but poor data for international networks.
- **IP2Region:** Another high-performance library popular in China.[9] While faster than QQWry, it is still primarily maintained by the Chinese open-source community and may default to Chinese location names.

Refactoring Implication: Replace all IP resolution logic with a standardized adapter for **MaxMind GeoLite2** or **IPinfo.io**. This ensures English output (ISO 3166 standards) and global accuracy.

2.3. Codebase Discrepancies: The Repository Gap

While the original HFish repo is accessible, the target derlemue/honey-scan repo was inaccessible during the audit. The fallback analysis relies on the provided documentation (Honey-Scan Reports 1 & 2).[10]

- **The Conceptual Gap:** The honey-scan documentation describes a **Python-based active scanner** designed to *find* honeypots. HFish is a **Go-based passive honeypot**

designed to *be* found.

- **The Convergence Strategy:** The user's goal is to "modernize the codebase" of HFish but use the "Honey Scan" brand/target. The logical path forward is to re-platform HFish (the passive sensor) while potentially integrating the logic from the Honey-Scan reports (fingerprinting) as an **Analysis Module**. This allows the honeypot to not just log an attack, but to actively analyze the attacker (active defense).

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3. Critical Architectural Challenge: The Performance Dilemma

User Hypothesis: Refactor the backend from Go to PHP/Python to "improve performance."
Architectural Ruling: VETO (Conditional).
As a Senior Architect, I must formally reject the proposal to move the *Network Listener Core* to PHP or Python. The evidence overwhelmingly supports Go for this specific component. The user's hypothesis likely stems from a misunderstanding of "performance" (perhaps confusing development velocity with execution throughput) or a familiarity bias towards PHP/Python.

3.1. Throughput & Concurrency Modeling

Honeypots are unique network applications. Unlike a standard web server that serves legitimate traffic, a honeypot is a target of *intentional* Denial of Service (DoS) and massive botnet sweeps. It must handle thousands of simultaneous "half-open" connections, malformed packets, and protocol fuzzing without crashing.

3.1.1. Go (Golang) Analysis: The Concurrency Champion

- **The Goroutine Model:** Go uses "Green Threads" (Goroutines). A Go runtime can spawn tens of thousands of goroutines on a single OS thread. The Go scheduler manages context switching in userspace, avoiding the expensive kernel-level context switches required by OS threads.
- **Memory Footprint:** A starting goroutine consumes ~2KB of stack space.[1] This allows a modest server (e.g., 2GB RAM) to theoretically hold tens of thousands of concurrent idle connections.
- **I/O Model:** Go's net/http and net/tcp libraries utilize a non-blocking I/O poller (epoll on Linux, kqueue on BSD/macOS, IOCP on Windows) under the hood but present a synchronous coding style. This allows developers to write simple, linear code that executes asynchronously.
- **Benchmark Evidence:** In high-concurrency TCP benchmarks, Go consistently handles 10k-100k connections with linear CPU scaling and low memory overhead.[11] It is specifically optimized for network services.

3.1.2. Python Analysis: The GIL Bottleneck

- **The Threading Model:** Python threads are native OS threads but are strictly serialized by the **Global Interpreter Lock (GIL)**. Only one thread can execute Python bytecode at a time within a single process.
- **Asyncio:** While asyncio allows for non-blocking I/O (similar to Node.js), it operates on a single thread. This is effective for I/O-bound tasks (waiting for a database), but a honeypot is often **CPU-bound** during an attack.
    - *Scenario:* An attacker floods the honeypot with SSH connection attempts. Each attempt requires cryptographic handshaking (RSA/ECC key exchange). This is CPU-intensive. In Python asyncio, these calculations block the event loop, causing the listener to stop accepting new connections until the handshake completes.[13]
- **Performance Gap:** In CPU-bound benchmarks (e.g., cryptographic handshakes common in SSH honeypots), Go outperforms Python by an order of magnitude (10x-30x).[15] A Python honeypot under a brute-force attack will max out a CPU core much faster than Go, leading to dropped connections and potential service exhaustion.

3.1.3. PHP Analysis: The Process Heavyweight

- **The Process Model:** Traditional PHP (FPM) spawns a worker process per request. This is catastrophic for long-lived TCP connections (like a Telnet session or an SSH tunnel). If you have 500 active attackers, you need 500 PHP processes. Each process consumes significant memory (10MB-50MB+), quickly exhausting gigabytes of RAM.
- **Swoole/RoadRunner:** Modern PHP extensions (Swoole) allow persistent memory and async I/O.[17] While these tools bring PHP closer to Go in benchmarks, they fundamentally change the PHP development model.
    - *Risk:* Using Swoole requires managing memory manually (avoiding leaks in long-running processes), handling coroutine contexts, and avoiding blocking functions. Most standard PHP libraries (like database drivers or logging) are designed for the short-lived FPM model and may leak memory or block the event loop if used in a persistent server.[3]
- **Suitability:** Using PHP for a raw TCP listener is an "anti-pattern" in enterprise architecture unless the team is hyper-specialized in Swoole internals. It adds unnecessary complexity when Go solves this problem natively.

3.2. Comparative Benchmark Matrix

The following table summarizes the performance characteristics relevant to a high-interaction honeypot sensor.

Feature	Go (Baseline)	Python (Proposed)	PHP (Swoole)	Impact on Honeypot Operations
Concurrency	Goroutines	Asyncio (1:N) +	Coroutines	**Go Wins:**

Model	(M:N)	GIL	(1:N)	Essential for handling massive concurrent botnet floods without latency.
Memory per Conn	~2 KB	~20-50 KB (Object overhead)	High (Process/Obj overhead)	**Go Wins:** Allows higher density of attackers per node; critical for low-cost VPS deployment.
Crypto Performance	High (Native ASM)	Medium (C-bindings, blocked by GIL)	Medium (OpenSSL bindings)	**Go Wins:** SSH/TLS handshakes are CPU-heavy; Go handles these without blocking the listener.
Startup Time	Instant (Static Binary)	Slow (Interpreter Init)	Slow (Framework Boot)	**Go Wins:** Critical for container orchestration, auto-scaling, and "respawning" after a crash.
Deployment	Single Static Binary	Requires Runtime + Venv	Requires Runtime + Exts	**Go Wins:** Easy deployment on compromised/remote sensors; zero

				dependency hell.
Ecosystem Strength	Networking/Systems	Data Science/ML/Scripts	Web UI/CMS	**Hybrid:** Use Go for Networking, Python for Analysis, PHP for UI.

3.3. The Recommended Hybrid Architecture

We will not port the backend; we will **decouple** it. This strategy aligns with the "Microservices" or "Service-Oriented Architecture" (SOA) principles, using the best tool for each job.

1. **Core Engine (Go):** Retained for the "Node" (Sensor) and the "Ingest" layer of the Management Server.
   - *Responsibility:* High-speed traffic handling, protocol emulation (SSH/Telnet/HTTP), raw log forwarding, and heartbeat management.
   - *Justification:* Stability, performance, and security.
2. **Management UI (PHP):** The user expressed interest in PHP. We can rebuild the *Dashboard* and *Configuration Interface* in PHP (e.g., Laravel).
   - *Responsibility:* User authentication, data visualization (charts/graphs), configuration forms, and report generation.
   - *Integration:* The Go engine will expose a REST API that the PHP frontend consumes. This plays to PHP's strength: rapid UI development and HTML rendering.
3. **Analysis Worker (Python):** The "Brain" for threat intelligence.
   - *Responsibility:* Complex data processing. The Go engine pushes structured logs to a queue (Redis/Kafka). A Python service consumes these logs to perform signature matching (using the logic from honey-scan PDF), GeoIP resolution, and statistical analysis.
   - *Justification:* Python has the best libraries for data analysis (Pandas, NumPy) and pattern matching.

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4. Implementation Roadmap & Modernization Strategy

This roadmap transforms the monolithic Chinese-centric HFish into the modular, international "Honey Scan" platform.

Phase 1: Sanitation & De-Localization (The "Great Firewall" Removal)

Objective: Strip all dependencies that bind the software to the Chinese ecosystem and establish a clean, neutral baseline.

1. **Codebase Audit & Purge:**
    - **Domain Sweep:** Grep codebase for hardcoded domains (*.cn, qq.com, aliyun.com, 163.com). Replace Chinese update servers with GitHub Releases or a neutral CDN.
    - **Alert Driver Removal:** Delete wechat.go, dingtalk.go, feishu.go from the pkg/alert directory.[6] Remove their configuration structs from config.ini templates.
    - **Library Replacement:** Delete qqwry.dat loaders. Replace ip2region bindings with a generic interface GeoProvider and implement a driver for MaxMind GeoLite2.
2. **String Externalization (i18n):**
    - **Current State:** Error messages, logs, and default templates are likely in Simplified Chinese (GBK or UTF-8 CN).
    - **Action:** Implement a strict i18n interface in Go (using golang.org/x/text). Move all hardcoded strings to locales/en-US.json.
    - **Constraint:** The default locale must be en-US. Remove zh-CN as a default fallback. Ensure all timestamp formatting uses ISO 8601 (UTC) instead of China Standard Time (UTC+8).
3. **Dependency Chain Repair:**
    - Replace goproxy.cn (often found in go.mod or build scripts) with standard proxy.golang.org.
    - Replace Chinese mirrors of Docker images (e.g., registry.cn-hangzhou.aliyuncs.com) in Dockerfile with standard Docker Hub or Quay.io references.

Phase 2: Architecture Refactoring (The Hybrid Split)

Objective: Implement the separation of concerns between Go (Core), PHP (UI), and Python (Analysis).

Step 2.1: The API Contract (Go Refactoring)

The current Go backend serves HTML directly (likely via Gin/Beego templates). We must sever the presentation layer from the logic layer.

- **Refactor:** Convert the Go Management Server into a "Headless" API Server. Strip all HTML/CSS/JS assets from the Go binary.
- **Output:** A clean JSON REST API (Swagger/OpenAPI 3.0 defined).
    - GET /api/v1/nodes/status - Monitor sensor health.
    - POST /api/v1/config/honeypot - Push configuration to sensors.
    - GET /api/v1/events/latest - Retrieve raw attack data.

Step 2.2: The New UI (PHP Implementation)

- **Stack:** Laravel or Symfony (modern PHP standards).
- **Function:** This application acts as the frontend. It holds no persistent network connections to sensors; it communicates exclusively with the Go API.

- **Benefit:** Allows the user (derlemue) to customize the dashboard using familiar PHP templating (Blade/Twig) without recompiling the Go binary. It isolates the "unsecure" web rendering layer from the "secure" network listening layer.

Step 2.3: The Analysis Pipeline (Python Integration)

- **Integration:** Implement the honey-scan logic (from the uploaded PDF) here. This component acts as an asynchronous worker.
- **Workflow:**
  1. **Ingest:** Go Node receives an attack -> Pushes a JSON event to a Redis List (honeypot_events).
  2. **Process:** Python Worker (adapted from scanner.py in the PDF) pops the event.
  3. **Analyze:**
     - *Fingerprint:* Compare the attacker's payload against a signatures.json database.
     - *Enrich:* Query Threat Intelligence APIs (GreyNoise, VirusTotal).
     - *Score:* Calculate a "Honey Score" to rate the severity.
  4. **Store:** Python Worker writes the enriched, structured data back to the primary database (MySQL/PostgreSQL).

Phase 3: Migration & Data Structures

Objective: Move from ad-hoc storage to a structured, English-native schema.

1. **Database Migration:**
   - **Schema Standardization:** Rename tables and columns from Chinglish (e.g., user_denglu, bj_ip) to standard English (user_login, attacker_ip).
   - **Standardization:** Enforce strict typing. Migrate loosely defined TEXT fields used for JSON blobs into native JSON columns (supported by modern MySQL/Postgres) for better queryability.
2. **Configuration Migration (config.ini):**
   - The HFish config.ini is notoriously fragile and often commented in Chinese.
   - **Action:** Migrate the configuration format to **YAML** or **TOML**. These formats are more readable and standard in the Go ecosystem.
   - **New Structure:**

```yaml
# Honey Scan Configuration (example)
server:
  bind: "0.0.0.0"
  port: 443
database:
  type: "mysql"
  host: "localhost"
integrations:
  geoip: "maxmind"
  alerts:
```

```
  - type: "slack"
    webhook: "https://hooks.slack.com/..."
```

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5. Visual Analysis & Architectural Diagrams

5.1. Repository Diff Analysis: Legacy vs. Target

This diagram visualizes the transformation logic, highlighting the removal of localized debt and the introduction of the hybrid components.

Code-Snippet

```
graph TD
    subgraph "Legacy Baseline: hacklcx/HFish"
    A[Go Monolith] -->|Contains| B(Hardcoded HTML/UI)
    A -->|Contains| C(CN Alert Drivers: Wechat/DingTalk)
    A -->|Contains| D(QQWry.dat IP Database)
    A -->|Supports| E(Domestic CPUs - Loongson/Kunpeng)
    end

    subgraph "Transformation Actions"
    B -->|Delete & Replace| F
    C -->|Delete & Abstract| G[Generic Notification Interface]
    D -->|Replace| H[MaxMind/IPinfo Adapter]
    E -->|Simplify| I
    end

    subgraph "Target State: derlemue/honey-scan"
    J[Go Core API Gateway] -->|Exposes| K(REST API)
    L -->|Consumes| K
    M[Python Analysis Engine] -->|Processes| N(Event Queue / Redis)
    end

    F --> J
    G --> J
    H --> M
    I --> J
```

5.2. Target Hybrid Architecture

The recommended high-performance stack leverages the strengths of each language.

Code-Snippet

```
C4Context
  title Target Architecture: Honey Scan Hybrid Stack

  Boundary(b1, "Edge Layer (The Sensors)") {
    System(node, "Sensor Nodes (Go)", "Distributed agents simulating SSH, HTTP, MySQL. Handles raw TCP/IP connections. Zero-dependency static binary.")
  }

  Boundary(b2, "Core Layer (The Hub)") {
    System(api, "API Gateway (Go)", "Headless Go binary. Receives telemetry from Nodes via gRPC/RPC. Handles Authentication & Rate Limiting.")
    SystemQueue(queue, "Message Broker (Redis)", "Buffers high-velocity attack data for asynchronous processing.")
  }

  Boundary(b3, "Processing Layer (The Brain)") {
    System(worker, "Analysis Engine (Python)", "Consumes queue. Performs GeoIP resolution, Regex Signature Matching, and Threat Intel correlation.")
    SystemDb(db, "Primary DB (PostgreSQL/MySQL)", "Stores structured, enriched attack data.")
  }

  Boundary(b4, "Presentation Layer (The Face)") {
    System(ui, "Admin Dashboard (PHP)", "Laravel/Symfony application. Visualizes data from DB and configures the Core via API.")
  }

  Rel(node, api, "RPC / gRPC", "Encrypted Telemetry")
  Rel(api, queue, "Push Events", "JSON")
  Rel(queue, worker, "Pop Events", "Async Processing")
  Rel(worker, db, "Write Results", "SQL")
  Rel(ui, db, "Read Stats", "SQL")
  Rel(ui, api, "Config Management", "REST/HTTP")
```

5.3. Migration Workflow

The step-by-step logic for the code migration, ensuring a safe transition.

Code-Snippet

```
flowchart TD
    Start() --> Audit{Audit Codebase}
    Audit -->|Found CN Logic| Clean
    Audit -->|Found Hardcoded UI| Strip

    Clean --> Std
    Strip --> API

    Std --> I18n
    API --> I18n

    I18n --> Build
    Build -->|Go| Core
    Build -->|PHP| Web
    Build -->|Python| Ana

    Core --> Test{Load Testing}
    Test -->|Pass >10k Conn| Deploy
    Test -->|Fail| Opt[Optimize Goroutines / Memory]
    Opt --> Test
```

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6. Detailed Technical Justification for Recommendations

6.1. Why "Go" is Non-Negotiable for the Listener

The HFish architecture documentation highlights "extremely low performance requirements" as a feature. This is achieved because Go compiles to machine code. A Python listener using socket or Twisted introduces an interpretation layer.

- **Garbage Collection (GC):** Go's GC is optimized for low-latency network services. Python's Reference Counting + GC cycles can cause "stop-the-world" pauses during

high-traffic events (e.g., a DDoS attack on the honeypot). If the GC pauses the listener for even a few hundred milliseconds during a handshake, the attacker may detect the anomaly, revealing the honeypot.
- **Attack Surface Reduction:** A Go binary is static. A Python/PHP environment requires the interpreter and hundreds of system libraries to be present on the sensor node. If a sensor is compromised (escaped), the attacker has a full Python environment to use for lateral movement. A static Go binary gives them nothing but the binary itself.

6.2. The Value of Python in Analysis

While Go is superior for *moving* bytes, Python is superior for *understanding* them.

- The honey-scan PDF [10] describes regex-based signature matching (signatures.py). Python's re module and text processing capabilities are robust and developer-friendly for writing new detection signatures.
- By moving this logic to a background Python worker, we remove the CPU load from the sensor node. If the analysis script hangs on a complex regex (ReDoS attack), it does not block the sensor from accepting new connections from other attackers.

6.3. The PHP Compromise

The user asked for PHP. In a "pure" security architecture, we might use React or Vue for the frontend. However, acknowledging the user's preference and the likelihood of existing PHP hosting infrastructure (common in "Self-Hosted" communities):

- PHP is acceptable for the **Management Console** because the traffic volume to the dashboard is low (admins only).
- It creates a clear separation: **Control Plane (PHP)** vs. **Data Plane (Go)**. If the PHP dashboard is compromised via a web vulnerability, the attacker does not necessarily gain control over the Go listeners or the encryption keys used for node communication.

7. Conclusion and Next Steps

The "Honey Scan" modernization project is a viable and high-value initiative. The legacy "HFish" codebase provides a battle-tested, high-concurrency foundation in Go that should **not** be discarded in favor of slower interpreted languages for the core networking layer. Doing so would be a regression in capability.

By adopting the proposed **Hybrid Architecture**, the project will achieve:

1. **Global Relevance:** By excising the specific Chinese integrations and domestic hardware support.
2. **Peak Performance:** By retaining Go for the heavy lifting of network I/O.
3. **Developer Ergonomics:** By utilizing Python for the logic-heavy analysis and PHP for the user-facing interface, aligning with the user's preferred stack without compromising

security or stability.

Immediate Next Steps:

1. **Fork:** Create honey-scan-core from HFish.
2. **Sanitize:** Execute Phase 1 (Remove pkg/alert and qqwry.dat).
3. **Decouple:** Begin Phase 2 by stripping the UI routes from the Go gin router and exposing the raw data endpoints.
4. **Interface:** Begin drafting the PHP Laravel dashboard to consume these endpoints.

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