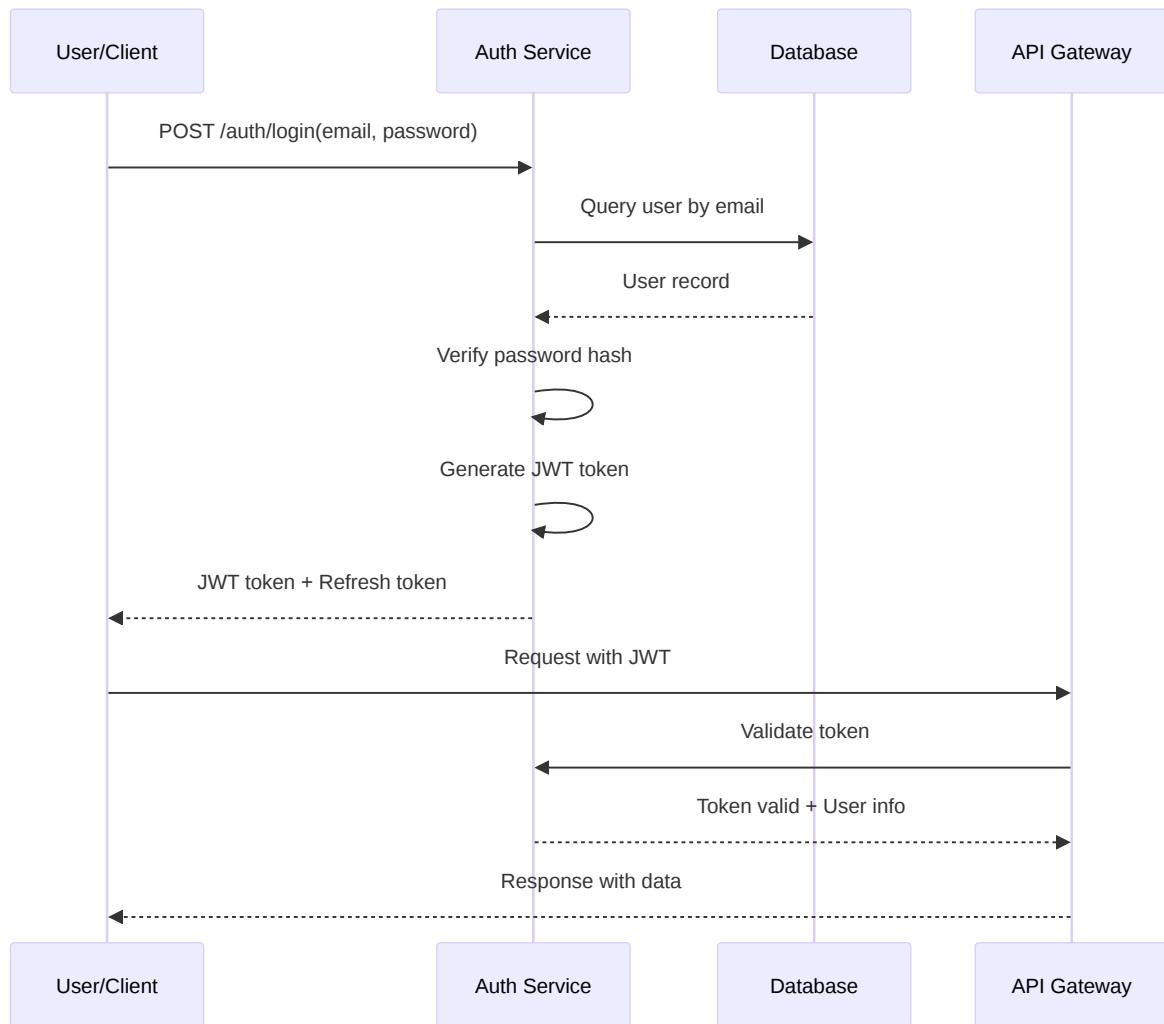
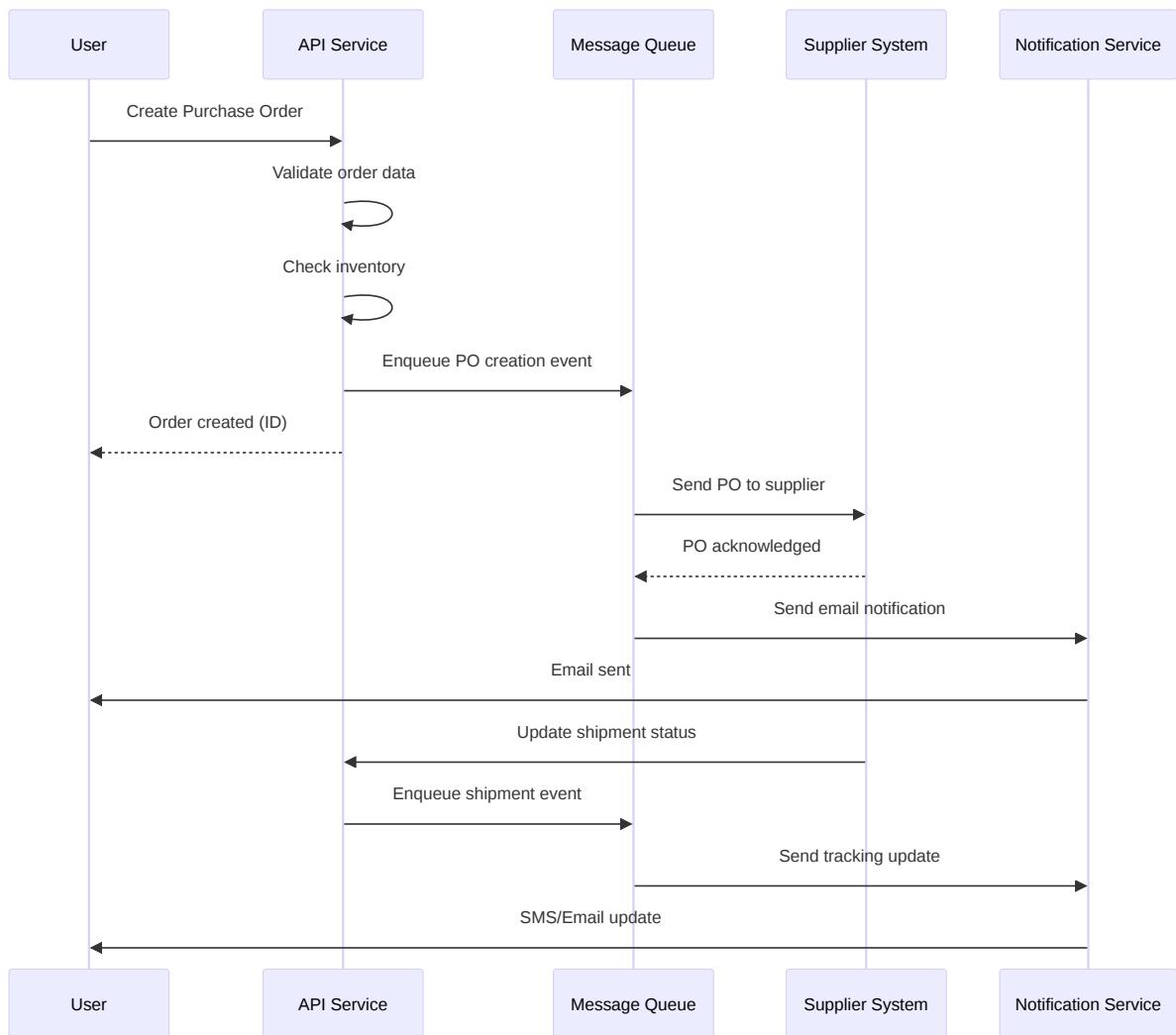


IMSOP - API Flows & Sequences

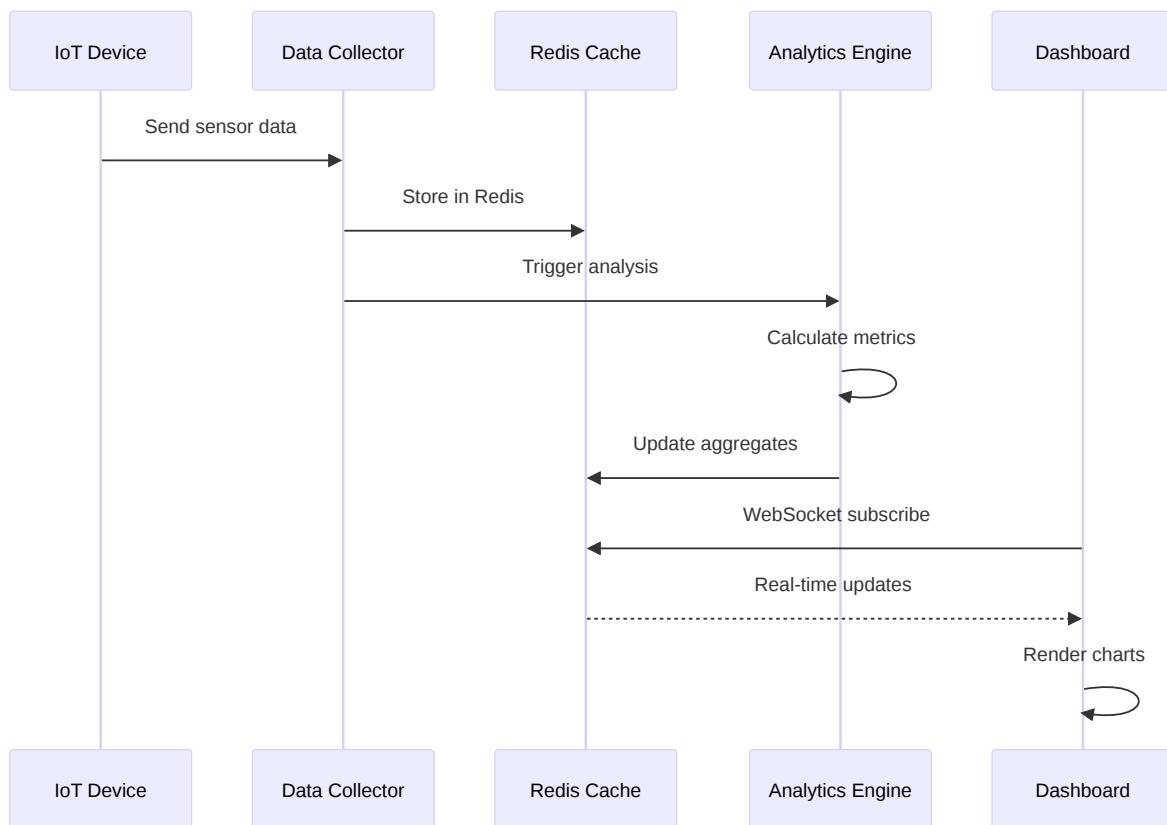
Authentication Flow



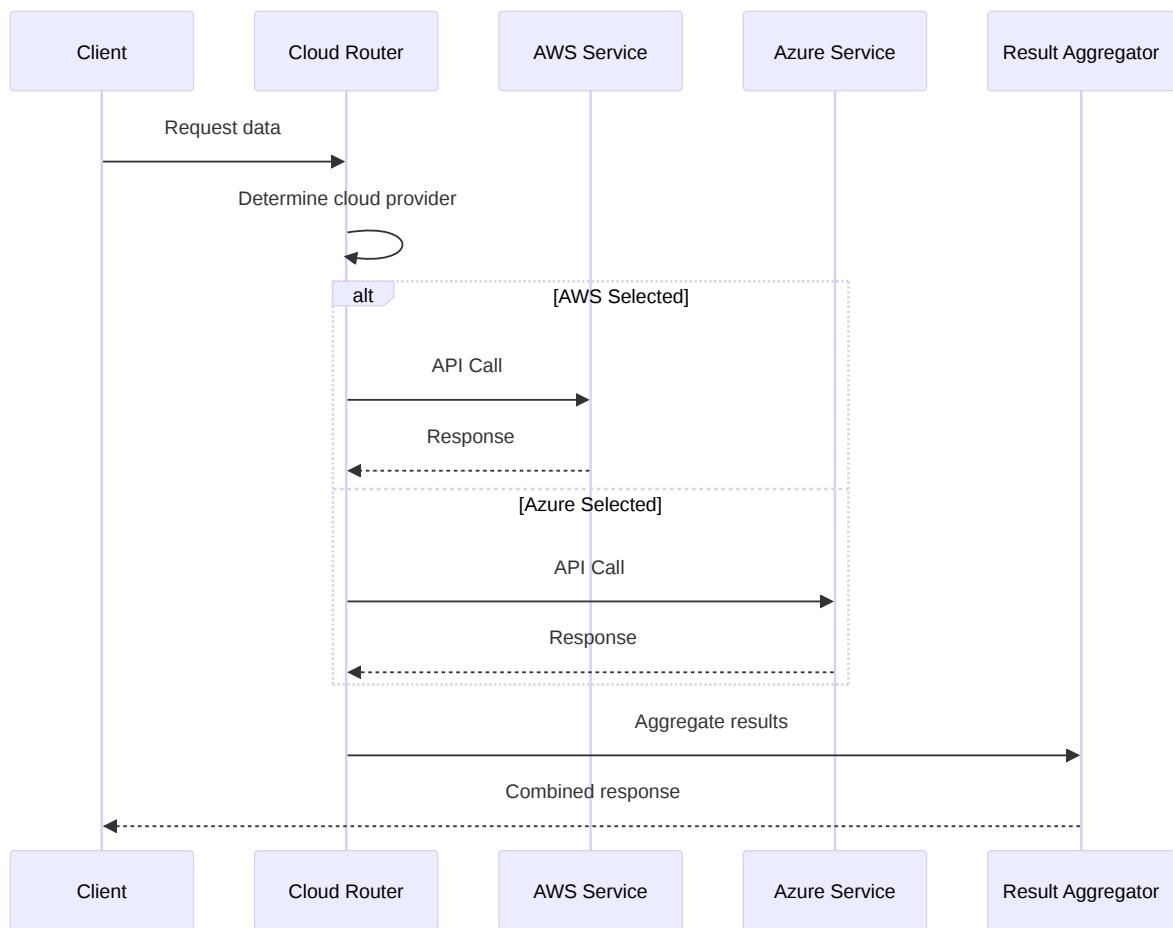
Supply Chain Order Flow



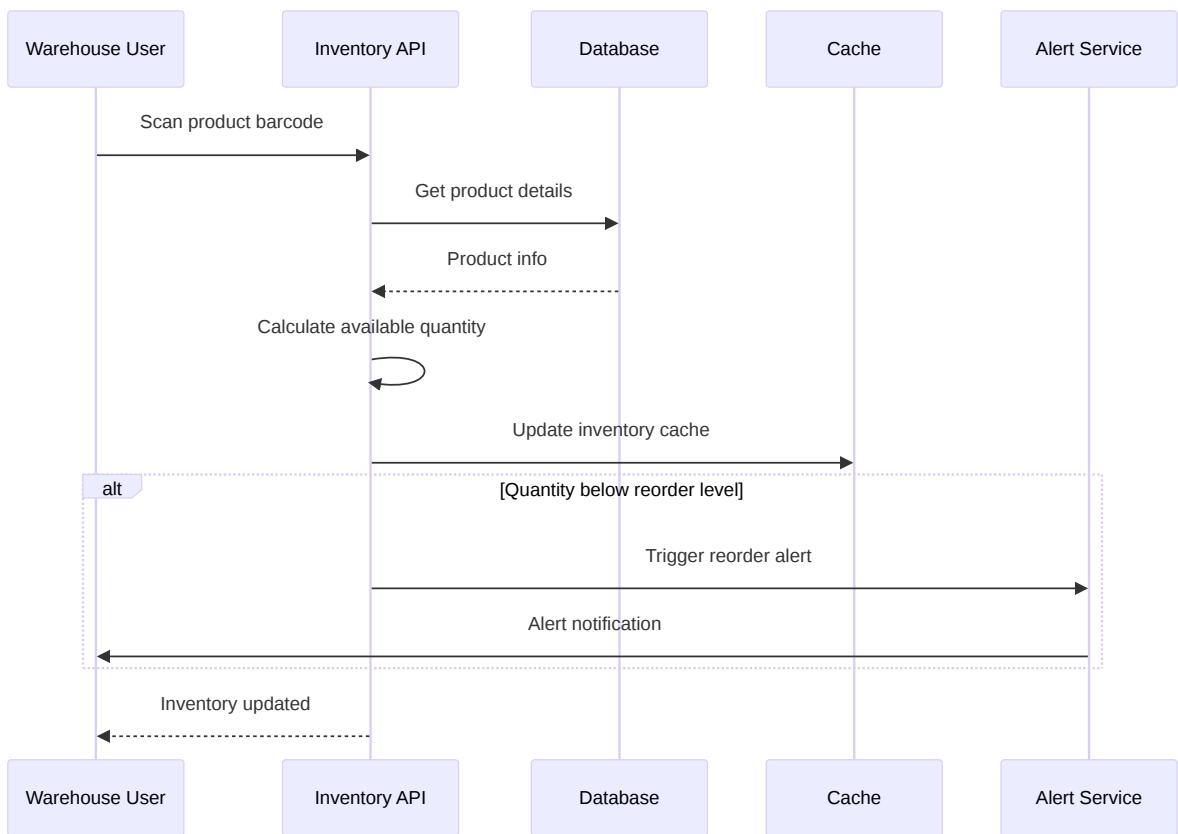
Real-time Analytics Flow



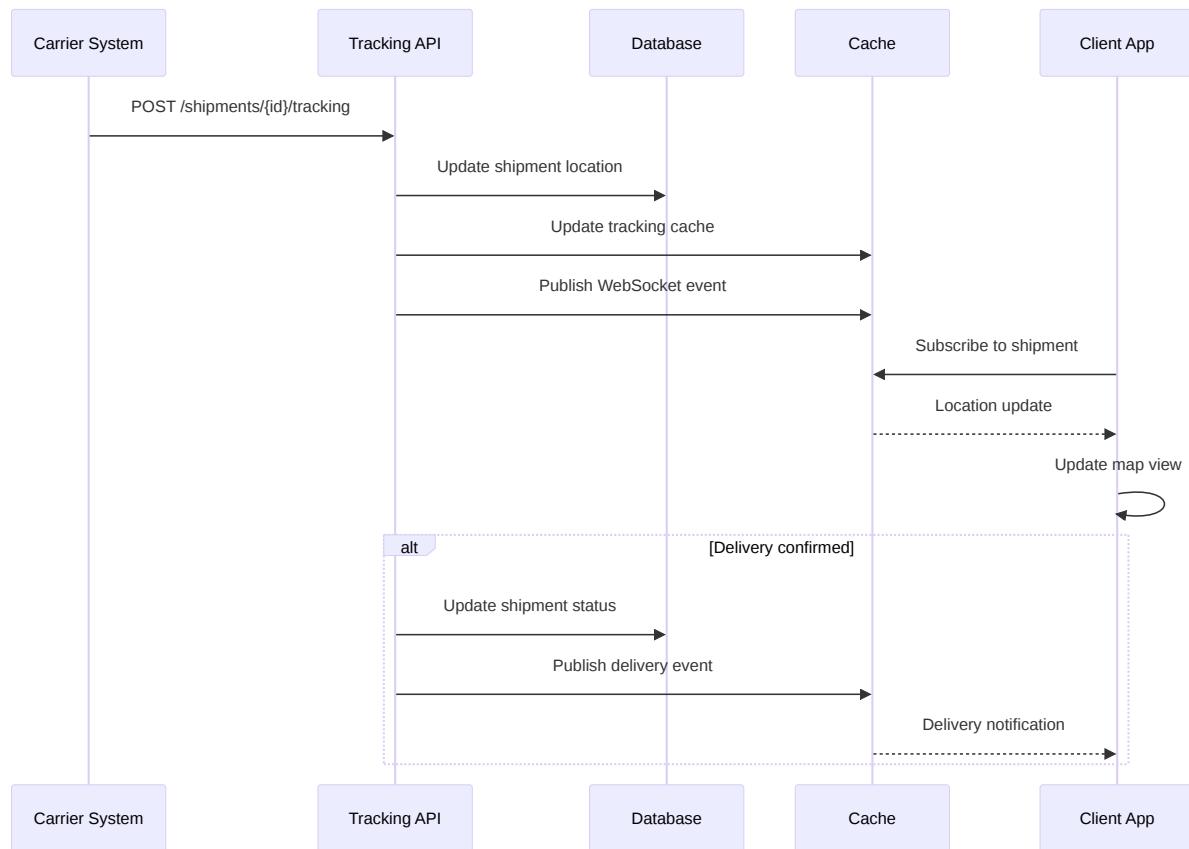
Multi-Cloud Integration Flow



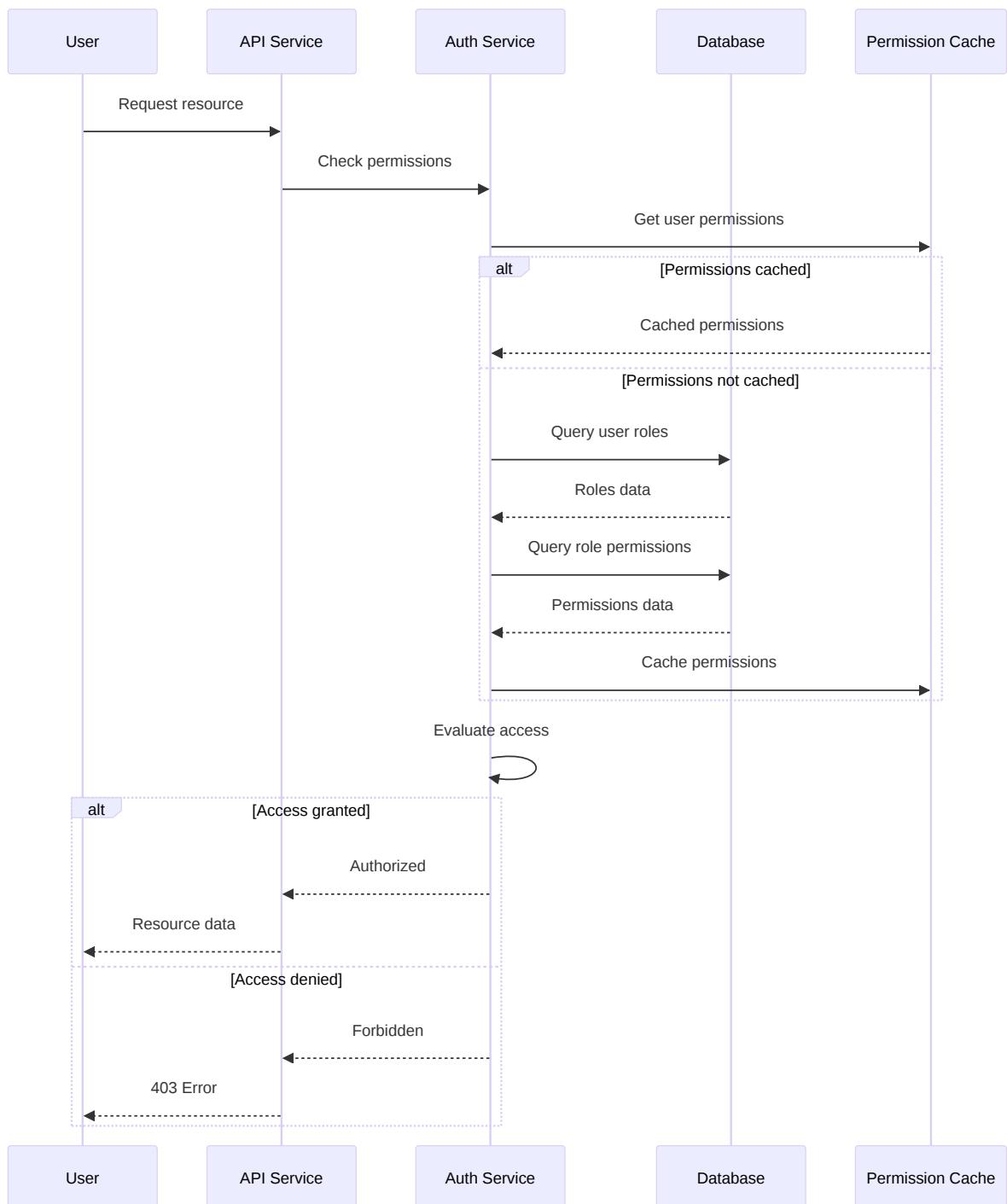
Inventory Management Flow



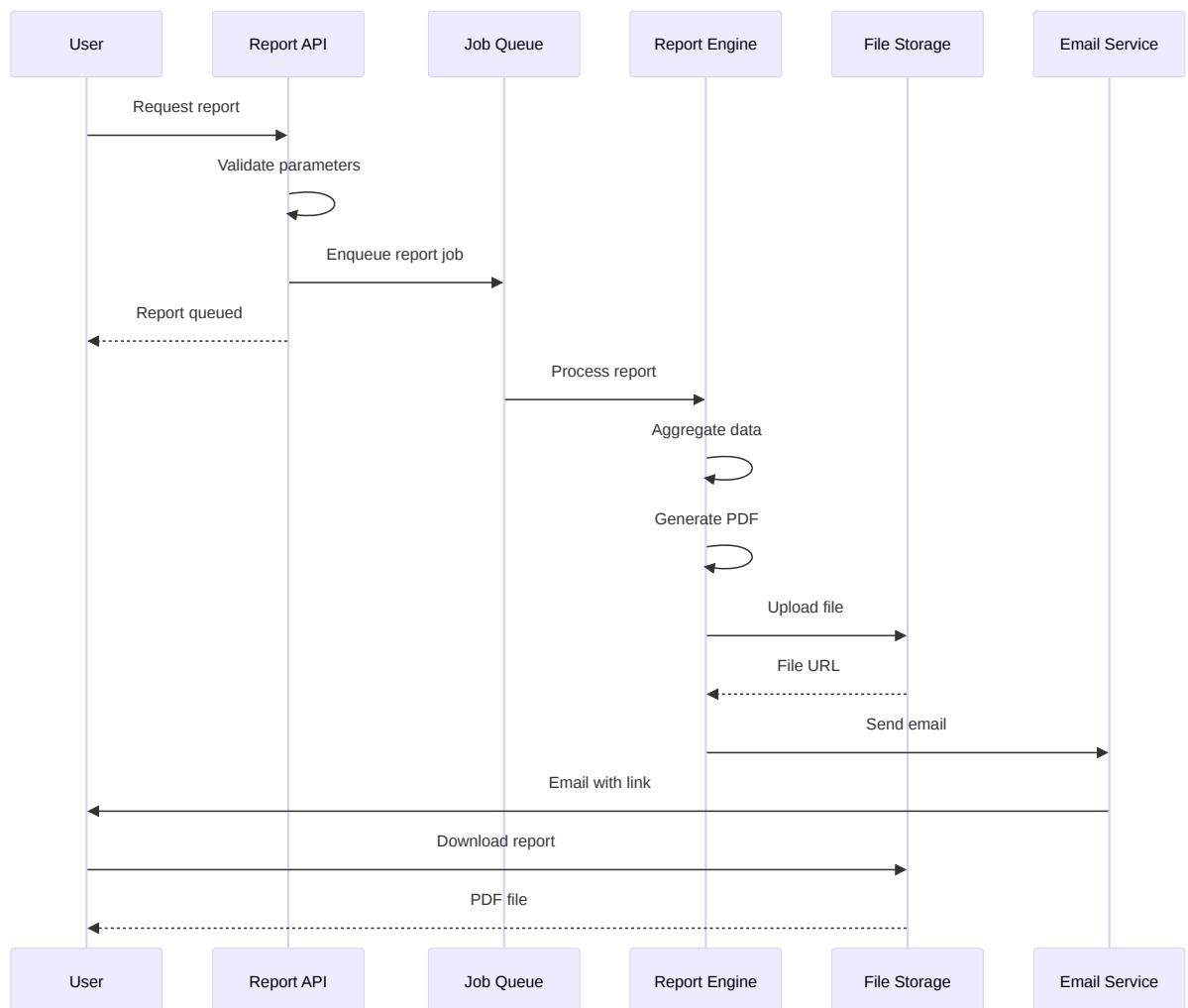
Shipment Tracking Flow



User Permission Flow



Report Generation Flow



API Response Formats

Success Response

```
{  
  "success": true,  
  "data": {  
    "id": "uuid",  
    "name": "Example",  
    "createdAt": "2024-01-10T10:00:00Z"  
  },  
  "meta": {  
    "timestamp": "2024-01-10T10:00:00Z",  
    "version": "1.0"  
  }  
}
```

Error Response

```
{  
  "success": false,  
  "error": {  
    "code": "VALIDATION_ERROR",  
    "message": "Invalid input parameters",  
    "details": [  
      {  
        "field": "email",  
        "message": "Invalid email format"  
      }  
    ]  
  },  
  "meta": {  
    "timestamp": "2024-01-10T10:00:00Z",  
    "requestId": "req-12345"  
  }  
}
```

Paginated Response

```
{  
  "success": true,  
  "data": [  
    { "id": "1", "name": "Item 1" },  
    { "id": "2", "name": "Item 2" }  
,  
  "pagination": {  
    "page": 1,  
    "pageSize": 20,  
    "total": 100,  
    "totalPages": 5,  
    "hasNextPage": true,  
    "hasPreviousPage": false  
  }  
}
```

Rate Limiting Configuration

Endpoint Type	Requests/Minute	Burst
Authentication	5	10
Read Operations	60	100
Write Operations	30	50
Bulk Operations	10	20
Search	30	50

Timeout Configuration

Operation	Timeout
API Request	30s
Database Query	10s
File Upload	5m
Report Generation	10m
WebSocket Connection	30s (idle)

API Versioning Strategy

URL-based Versioning

```
/api/v1/orders  
/api/v2/orders
```

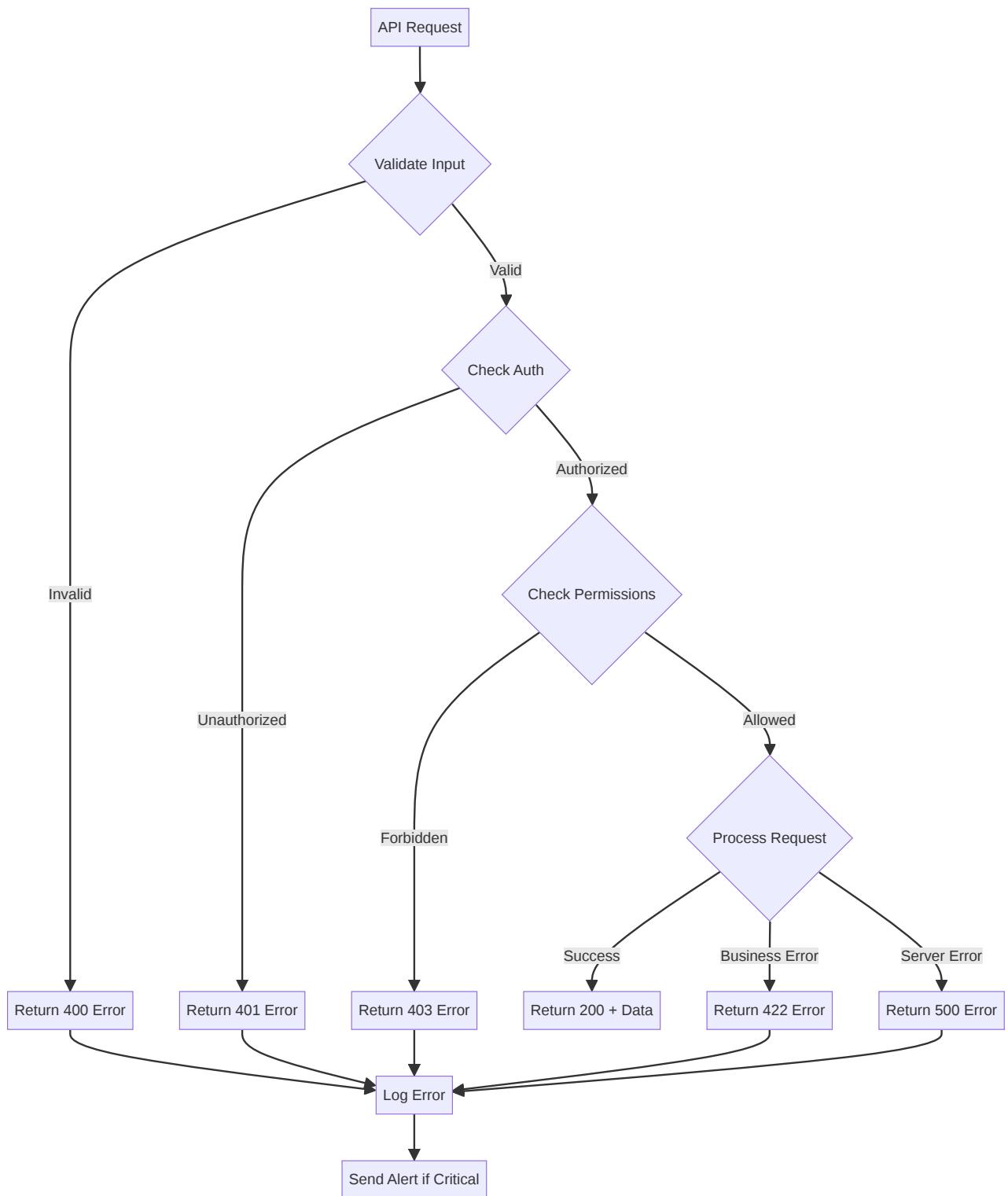
Header-based Versioning

```
Accept: application/vnd.imsop.v1+json
```

Deprecation Policy

- Announce deprecation 6 months in advance
- Maintain deprecated version for 12 months
- Provide migration guide
- Support both versions during transition

Error Handling Flow



WebSocket Connection Management

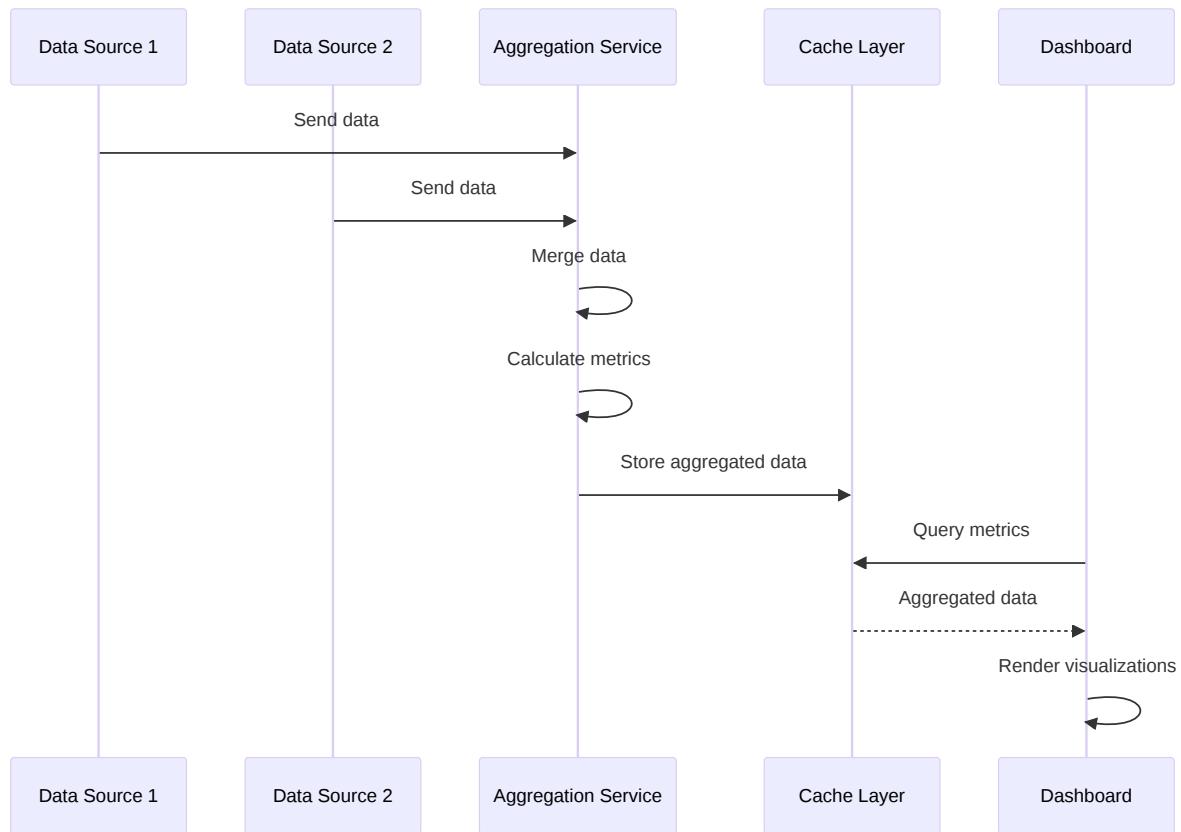
Connection Flow

1. Client initiates WebSocket connection
2. Server validates JWT token
3. Server subscribes client to channels
4. Server sends initial state
5. Client receives real-time updates
6. Connection maintained with heartbeat
7. Client disconnects or timeout

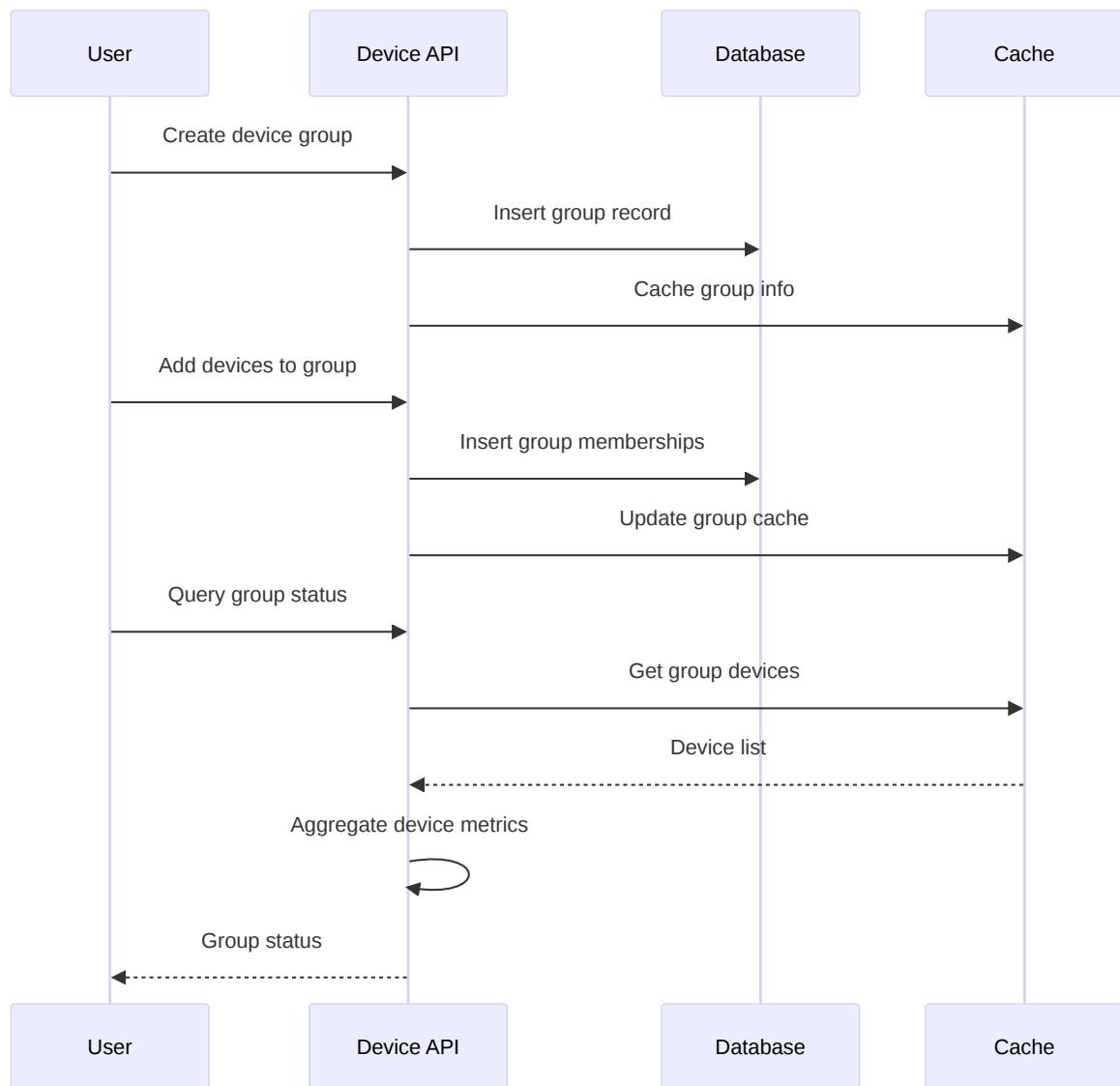
Message Format

```
{  
  "type": "update",  
  "channel": "shipments:123",  
  "event": "status_changed",  
  "data": {  
    "shipmentId": "123",  
    "status": "in_transit",  
    "location": "New York, NY"  
  },  
  "timestamp": "2024-01-10T10:00:00Z"  
}
```

Data Aggregation Flow



Multi-Device Grouping Flow



Performance Optimization Strategies

Caching Strategy

- Cache frequently accessed data (5 min TTL)
- Cache user permissions (10 min TTL)
- Cache product catalog (1 hour TTL)
- Cache organization settings (1 day TTL)

Query Optimization

- Use database indexes for common queries
- Implement query result pagination
- Use projection to select only needed fields
- Batch related queries together

Async Processing

- Queue long-running operations
- Process reports asynchronously
- Send notifications asynchronously
- Archive data asynchronously

Load Distribution

- Distribute requests across multiple servers
- Use message queues for async tasks
- Cache responses at CDN level
- Implement request batching