concise differentiation between **JDK**, **JVM**, and **JRE**:

| **Component** | **Full Form** | **Purpose** | **Contains** | **Used By** |
| --- | --- | --- | --- | --- |
| **JDK** | Java Development Kit | Used for **developing and running** Java applications | JRE + Development Tools (javac, debugger, etc.) | **Developers** |
| **JRE** | Java Runtime Environment | Used for **running** Java applications | JVM + Libraries (rt.jar, etc.) | **End Users** |
| **JVM** | Java Virtual Machine | Executes Java bytecode (platform-independent) | Part of JRE | **Both** Developers and End Users |

**🔍 Quick Summary:**

* **JDK = JRE + Development Tools**
* **JRE = JVM + Java Libraries**
* **JVM = The engine that runs the Java bytecode**

import java.util.\*;

import java.util.stream.\*;

public class MinFromList {

public static void main(String[] args) {

List<Integer> numbers = Arrays.asList(3, 2, 2, 3, 7, 3, 5);

IntSummaryStatistics stats = numbers.stream()

.mapToInt(x -> x)

.summaryStatistics();

System.out.println("Lowest number in list: " + stats.getMin());

}

}

**❓Problem Summary:**

* You have a **backend server** connected to a **database**.
* It’s behind a **reverse proxy** (e.g., NGINX, Apache, AWS ALB).
* A **client app** (web/mobile) has a **button**.
* When clicked:
  + App **freezes for ~60 seconds**
  + Only **after 60 seconds**, the query is sent, and the response is received.

**🚨 Suspected Root Cause:**

This is a classic symptom of a **network timeout, DNS resolution delay, or proxy misconfiguration**.

It is **not a backend processing delay**, because:

* The query **hasn't even reached** the server until 60 seconds pass.

**✅ Step-by-Step Debugging Approach**

**🔍 1. Client-Side Inspection**

**Goal**: Is the request stuck before reaching the server?

* Use browser dev tools (Network tab in Chrome) or tools like Charles Proxy, Fiddler, Postman (for mobile).
* Check:
  + Does the request appear immediately when the button is clicked?
  + Or does it only appear after 60 seconds?

🔁 **If it appears after 60 sec** → issue is on **client side or DNS/proxy delay**, not backend.

**🌐 2. DNS and Network Layer**

**Goal**: Is there a delay in resolving or connecting?

* Try nslookup, ping, or traceroute on the backend domain.
* If using a **custom domain** (e.g., via reverse proxy like NGINX), check:
  + **DNS TTL values**
  + **Stale DNS entries** in the client OS
  + Use dig to analyze DNS propagation.

🛠️ Try replacing the backend domain with its **IP address** in the client for testing.

**🌐 3. Reverse Proxy Configuration**

**Goal**: Is the proxy causing the delay?

Check the **reverse proxy (NGINX/Apache/AWS ALB)** for:

* Timeout settings:
  + proxy\_connect\_timeout
  + proxy\_read\_timeout
  + client\_body\_timeout
* SSL misconfigurations
* Keep-alive settings
* Incorrect upstream server reference

🧪 Use tools like curl -v or httping to test latency between proxy and backend.

**💾 4. Backend Logs**

**Goal**: Confirm whether the server sees the request late or responds late.

* Add **timestamped logs** to the backend at:
  + When a request is received
  + When it responds
* If the backend log shows the request **only after 60 seconds**, the issue is **not in backend logic** — it confirms delay is **before** backend receives the request.

**📡 5. Mobile/Web App Code**

**Goal**: Is the client code waiting or blocking?

* Look for:
  + Blocking UI code (e.g., large sync operations on the main thread)
  + Async logic not triggered properly
  + Incorrect await/then usage
  + Hardcoded timeouts (e.g., 60000ms delay)
* Test API call in isolation using curl, Postman, or browser

**📜 6. Firewall / Security Layers**

**Goal**: Any middleware (e.g., WAF) introducing throttling?

* Check:
  + WAF (Web Application Firewall) rules
  + Rate limiting
  + NAT timeouts
  + Security groups (cloud environments)

**🧠 Final Diagnosis Examples:**

| **Scenario** | **Likely Root Cause** |
| --- | --- |
| Request seen **after** 60s in dev tools | Client blocking / DNS delay |
| Request seen immediately, response **after** 60s | Backend processing issue or DB lock |
| No request logged in backend until 60s later | Proxy/DNS issue |
| Only happens on mobile but not web | Mobile SDK, network permission, or proxy handling issue |

**✅ Tools You Can Use:**

* curl -v <endpoint>
* Browser DevTools
* Postman or Insomnia
* Backend access logs + timestamps
* DNS tools: dig, nslookup, ping
* tcpdump or Wireshark (if on-premise)