AWS Elastic Load Balancer (ELB) is a fully managed load balancing service provided by Amazon Web Services that automatically distributes incoming application traffic across multiple targets (like EC2 instances, containers, and IP addresses) in one or more Availability Zones.

🔍 Purpose of ELB

ELB improves **fault tolerance**, **availability**, and **scalability** by ensuring no single server gets overwhelmed. It also helps in performing **health checks** to route traffic only to healthy targets.

🧩 Types of AWS Load Balancers

AWS offers **four types** of load balancers, each suited for different use cases:

1. Application Load Balancer (ALB) — Layer 7 (HTTP/HTTPS)

- Best for web applications that need advanced routing.
- Works at the **application layer** of the OSI model.
- Can route traffic based on:
    - Host-based routing (e.g., api.example.com, shop.example.com)
    - Path-based routing (e.g., /api/*, /images/*)
    - Query strings and headers
- Supports WebSocket and HTTP/2

Use case: Microservices, containerized apps (like ECS), content-based routing

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2. Network Load Balancer (NLB) — Layer 4 (TCP/UDP)

- Handles millions of requests per second with ultra-low latency.
- Works at the **transport layer**.
- Routes traffic based on IP protocol data.
- Supports **TCP, UDP**, and **TLS** (for encrypted traffic)
- Can preserve client IP address

Use case: High-performance, low-latency applications, gaming servers, real-time systems

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3. Gateway Load Balancer (GWLB) — Layer 3 (IP)

- Designed for third-party **virtual appliances** (firewalls, intrusion detection systems, etc.)
- Operates at the **network layer**.
- Uses **GENEVE protocol** for traffic encapsulation.
- Makes it easy to deploy and scale inline appliances.

Use case: Network security and inspection appliances

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4. Classic Load Balancer (CLB) — Layer 4/7 (Legacy)

- Older generation; supports both **HTTP/HTTPS** and **TCP**.
- Less feature-rich compared to ALB and NLB.
- Still in use for legacy systems, but **not recommended** for new applications.

Use case: Legacy applications that haven't migrated to ALB or NLB yet

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🛠️ Summary Table

Type	OSI Layer	Protocols	Features	Use Case
Application (ALB)	7	HTTP, HTTPS	Content-based routing, WebSocket	Microservices, Web apps
Network (NLB)	4	TCP, UDP, TLS	High throughput, low latency	Real-time apps, games
Gateway (GWLB)	3	IP (GENEVE)	Traffic inspection, inline appliances	Security appliances
Classic (CLB)	4 & 7	HTTP, HTTPS, TCP	Legacy support	Older systems

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