Azure के 4 Load-Balancers — एक नज़र में "पासा-पलट" टेबल

(इसे interview याद-sheet की तरह रख सकते हो)

Feature 🏷️	Azure Load Balancer (Basic/Standard)	Azure Application Gateway (v2/WAF)	Azure Traffic Manager	Azure Front Door (Std/Premium)
OSI Layer / Protocol	L4 – TCP/UDP (no HTTP logic)	L7 – pure HTTP/HTTPS	DNS-level (name resolution)	L7 – HTTP/HTTPS only
Scope	**Regional** (एक region के अंदर)	**Regional**	**Global** DNS	**Global** edge (anycast POPs)
Backend मशीनें कहाँ?	VM/VMSS **same VNet**; single VNet per rule learn.microsoft.com	Any IP/FQDN reachable, लेकिन Gateway **dedicated subnet** में बैठता है learn.microsoft.comlearn.microsoft.com	कोई भी public-facing endpoint (Azure, on-prem, दूसरे cloud) learn.microsoft.com	Public IP/FQDN; Private Link केवल Premium edition
Same VNet/Availability-Set condition?	• Backend NICs same VNet • Per availability-set: max 1 Public + 1 Internal LB learn.microsoft.com	Gateway खुद dedicated subnet में; backend को same VNet होना **ज़रूरी नहीं** (public भी चलेगा)	VNet irrelevant (DNS answer देता है)	VNet irrelevant (Edge POP से public traffic)
Dedicated Subnet needed?	✗	☑ (GatewaySubnet-2) learn.microsoft.com	✗	✗
HTTP goodies (path-based, host-based, SSL offload, WAF)	कोई नहीं	✔ Path/host; SSL off/on; Optional WAF	✗ (DNS only)	✔ Path/host; Rules Engine; Built-in WAF; SSL certs auto-managed learn.microsoft.com

Feature 🏷️	Azure Load Balancer (Basic/Standard)	Azure Application Gateway (v2/WAF)	Azure Traffic Manager	Azure Front Door (Std/Premium)
Global/Geo routing	✕ (क्लासिक regional)	✕ (regional)	✔ Performance, Priority, Weighted, Geographic, MultiValue policies learn.microsoft.com	✔ Anycast POP => nearest POP; can steer by latency/health
Private endpoints	Internal LB subnet-private	Private front-end via VNet integration	✕	Premium: Private Link origins
Health probing	TCP/HTTP/HTTPS probes	HTTP/HTTPS custom probes (+active/passive)	DNS checks, probe HTTP/HTTPS	HTTP/HTTPS health probes
Typical use-case	VM Scale Set या AKS internal traffic	Web app layer-7 routing + WAF	Region-level fail-over via DNS	Global web acceleration + WAF + CDN-style routing
Free-tier support?	Basic LB free	Not free (v2 billed per-capacity)	Free (traffic-based charges)	Not free (Std/Prm)
Remember	*Same VNet, layer-4 only*	*Dedicated subnet, layer-7 brain*	*DNS answer बदलता है, कोई TCP सेशन touch नहीं*	*Edge POP पर TLS offload, geo-wide smart routing*

- **Inside one VNet VM-to-VM? → Azure Load Balancer.**
- **One region, path-based URL routing + WAF? → Application Gateway.**
- **Cross-region fail-over via DNS? → Traffic Manager.**
- **Globally distributed web front door + acceleration + WAF? → Azure Front Door.**

Azure Backup Services – Default Retention Period Table (AZ-104 Ready)

#	Backup Type / Service	Data Source	Default Retention Period	Notes
1	**Azure VM Backup**	Azure VMs (Windows/Linux)	**30 days**	- Daily snapshot - Policy customizable: up to 99 years
2	**Azure File Share Backup**	Azure Storage (Files)	**30 days**	- Daily backup - Can go up to 10 years
3	**Azure Blob Backup (Preview)**	Block Blobs	**None by default**	- You define your own backup schedule and retention
4	**Azure SQL Database Backup**	Azure SQL DB / MI	**7 days** (Default) **Up to 35 days** (Basic/Svc/Std)	- Long-term retention (LTR) possible: **up to 10 years** with LTR policies
5	**Azure Backup Server (MABS)**	On-prem VMs/Files/Apps	**5 days** (daily) **2 weeks** (weekly) – by default	- Highly customizable: daily/weekly/monthly/yearly
6	**Microsoft Azure Recovery Services (MARS Agent)**	On-prem Servers (Files/Folder)	**30 days**	- Max retention: up to **3,360 days (~9 years)**
7	**Snapshot-only (Instant Restore)**	Azure VMs	**2 days** (default)	- Part of Azure Backup - Kept in staging location
8	**Azure Backup Vault - Soft Delete**	VM backups	**14 days** (Soft delete period)	- After deletion, recovery available for 14 days
9	**Azure Kubernetes Backup (via Azure Backup)**	AKS Persistent Volumes (Preview)	**7 days**	- Retention is configurable
10	**Azure Backup for SAP HANA**	SAP DB on Azure VMs	**30 days**	- Can go up to 10 years
11	**Recovery Services Vault - Item Retention**	Multiple sources	**Retention policy-driven**	- Default backup policies define retention at item-level

What is WAF in Azure Application Gateway?

WAF = **Web Application Firewall**
It's a **layer-7 (HTTP/HTTPS)** security feature in **Azure Application Gateway** that **protects your web applications** from common threats and attacks.

Key Features of WAF on Application Gateway:

Feature	Details
Deployment	WAF is available on **Application Gateway v2 SKU**
Protection Ruleset	Based on **OWASP Core Rule Set (CRS)** Protects against: SQL injection, XSS, CSRF, command injection, etc.
Modes	1. **Detection mode** – logs alerts only 2. **Prevention mode** – actively blocks malicious traffic
Custom Rules	You can define your own match conditions (IP, headers, geo, etc.) to allow/block traffic
Logging	Logs are stored in Log Analytics, Storage, or Event Hub (Diagnostic settings)
Monitoring	Integrated with Azure Monitor; shows WAF logs, matches, and rule hits
Exclusions	Can exclude certain paths, params, headers from rules
Geo-filtering	You can block/allow traffic by country using custom rules
Autoscaling	App Gateway WAF v2 supports autoscaling and zone redundancy

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SKUs That Support WAF:

SKU	WAF Support	Notes
Application Gateway v1	✗ No	WAF not supported
Application Gateway v2	☑ Yes	Required for WAF
Application Gateway WAF v2	☑ Yes	WAF-enabled version

Common WAF Use Cases

- Protect public web apps from common attacks
- Filter traffic based on country, IP, headers
- Stop bot traffic and known bad patterns
- Compliance (OWASP, PCI-DSS, etc.)

💡 Exam/Interview Tips (AZ-104):

- WAF works only on **Application Gateway v2** SKU.
- **Prevention mode** is used to **actively block** suspicious traffic.
- Uses **OWASP Core Rule Set (CRS)**.
- WAF can be **integrated with Azure Front Door** too (global WAF).

WAF does not protect VMs directly **— only web layer (L7 traffic).**

🛡️ WAF (Web Application Firewall) vs 🔥 Azure Firewall

Feature	WAF (on App Gateway)	Azure Firewall
🔍 **Layer**	**Layer 7** (HTTP/HTTPS)	**Layer 3–4–7** (network, transport, some app protocols)
🧠 **Focus**	Protect **web apps** (HTTP/HTTPS) from OWASP attacks like SQLi, XSS, CSRF	Control **all outbound/inbound** traffic: any protocol (HTTP, RDP, DNS, SSH, SMB, etc.)
🌐 **Scope**	Works only for **HTTP/S apps** behind App Gateway	Applies to **entire VNet or subnet** — VMs, containers, etc.
⚙️ **Protocols supported**	HTTP / HTTPS	Any TCP/UDP + FQDN rules (HTTP, HTTPS, RDP, SSH, DNS, etc.)
🛡️ **Use case**	Secure web apps	Network-level firewall for **non-web traffic** + **centralized** control
🎯 **Granularity**	Request path, headers, cookies	Source/dest IP, port, protocol, FQDN
🧩 **Integration**	Tied to Application Gateway only	Works with **all network traffic** in a VNet
💰 **Pricing**	App Gateway + WAF pricing	Azure Firewall (per-hour + per-GB)

🧠 Example Scenarios

Scenario	Use WAF?	Use Azure Firewall?
Web app (HTTPS) exposed to internet	✅ Yes	❌ Maybe not
VMs need to browse internet (outbound control)	❌ No	✅ Yes

Scenario	Use WAF?	Use Azure Firewall?
Block specific countries from web app	✅ Yes (WAF custom rule)	✅ Optional
Secure RDP/SSH access from only 1 IP	❌ No	✅ Yes
Stop SQL injection/XSS	✅ Yes	❌ No
Enforce FQDN-based outbound rules (e.g., only allow `*.microsoft.com`)	❌ No	✅ Yes

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📌 Final Verdict

✅ **Use WAF when you want to secure your web applications (HTTP/HTTPS) against common threats.**
✅ **Use Azure Firewall when you need to control/monitor network-level traffic (RDP, SSH, DNS, etc.) across your VNet.**

🔁 So, **WAF ≠ Azure Firewall**.
If your architecture includes **web apps + backend VMs**, you'll often use **both together**:

```
csharp
CopyEdit
[User] → App Gateway (WAF) → Web App / API
                                ↓
                          Azure Firewall
                                ↓
                          Backend Subnet VMs
```

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🎯 Example Scenarios = ✅ Outbound Traffic

क्या हो रहा है	Traffic Direction
VM ne Stripe/PayPal API se payment verify kiya	✅ Outbound
VM ne Azure Blob Storage se image fetch kiya	✅ Outbound
VM ne weather API se data liya user ko dikhाने के लिए	✅ Outbound
VM ne Linux update ke लिए internet से package download किया	✅ Outbound
App ne SendGrid se email bhejna initiate किया	✅ Outbound

🌍 Internet

↓

[App Gateway + WAF] ←— HTTP/S web traffic

↓

[Frontend VM (Web app)]

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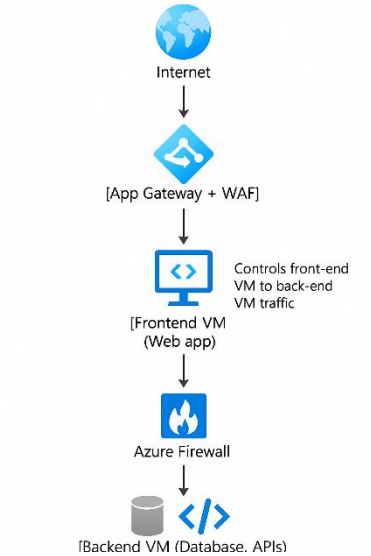
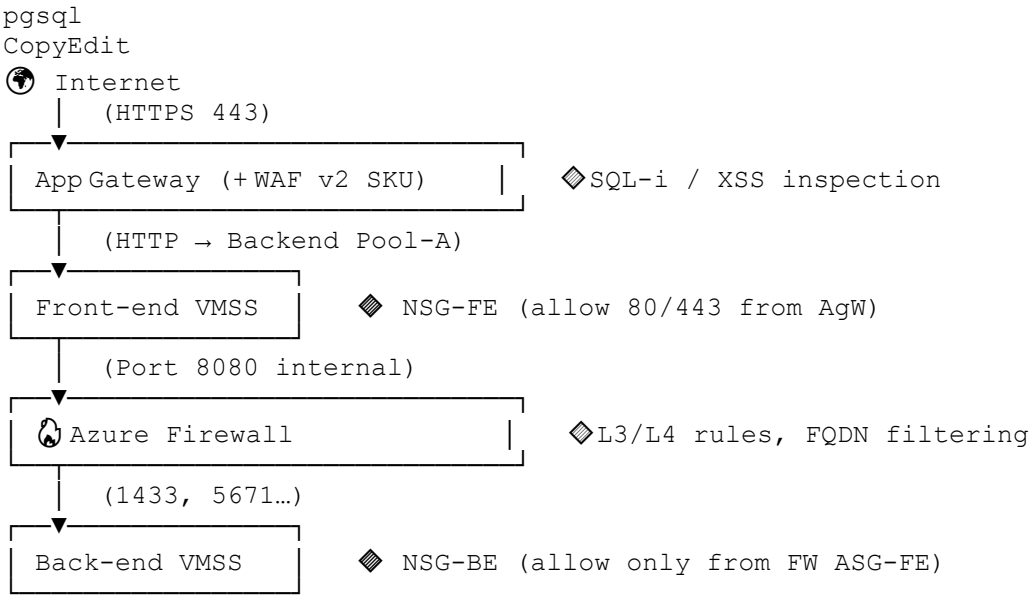
[Azure Firewall] ←— Controls front-end VM to back-end VM traffic

↓

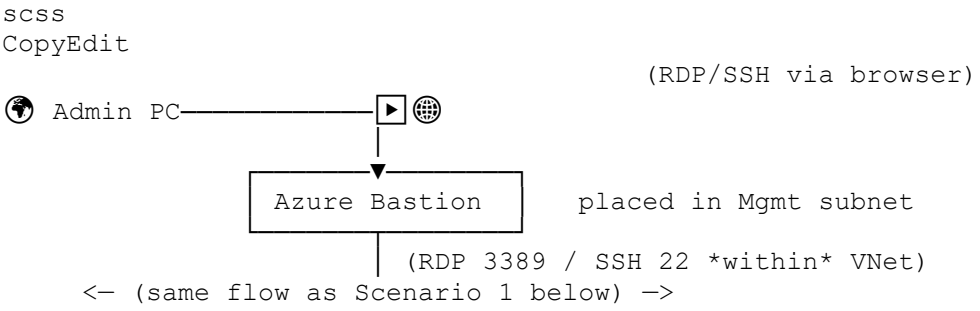
[Backend VM (Database, APIs)]



◈ Scenario 1 – "Classic 3-tier with App Gateway + WAF and Azure Firewall"

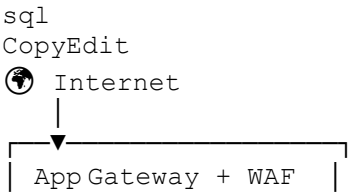


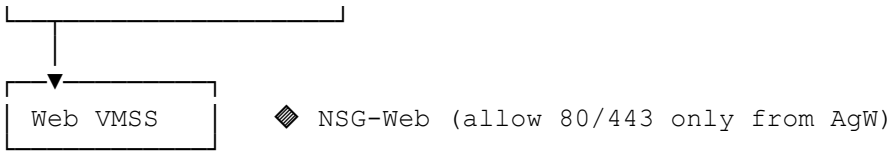
◈ Scenario 2 – Same as #1 plus Azure Bastion for management



Why: No public IPs on VMs; admins connect over Bastion. Add **NSG-Mgmt** to allow TCP 443 from corporate IPs only.

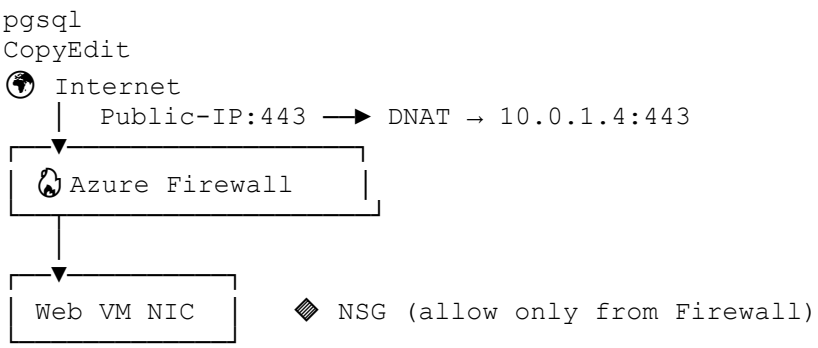
◈ Scenario 3 – App Gateway + WAF only (no Firewall) – small stateless site





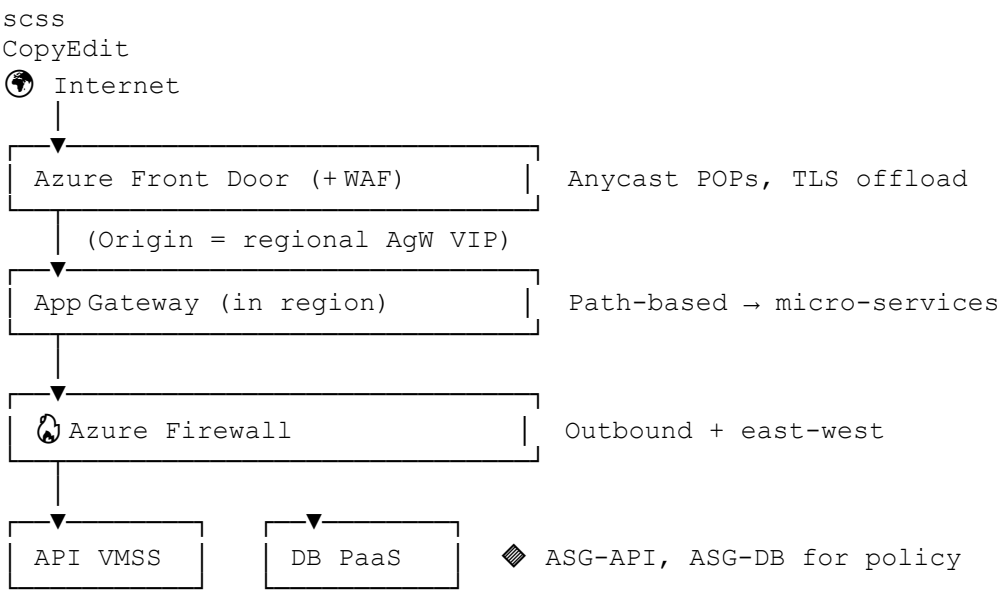
Use when: Pure web traffic, no complex back-end or outbound restrictions. Cheaper & simpler than adding Firewall.

Scenario 4 – Azure Firewall DNAT (no App Gateway) – lift-and-shift VM farm



When to use: Mixed protocols (HTTPS, RDP, SFTP) and you only need L3/L4 control; no WAF logic required.

Scenario 5 – Global web: Azure Front Door + WAF, regional App Gateway, internal Firewall



Why: Need global acceleration + centralized WAF (Front Door), regional app-layer routing (AgW), and full network security (Firewall).

🔑 Where NSG & ASG fit

Layer	Typical NSG / ASG Rule
NSG-Internet-Subnet	Deny all inbound (only FDoor/AgW public IPs allowed)
NSG-FE (front-end)	Allow 80/443 from AgW subnet only; Deny all else
NSG-BE (back-end)	Allow SQL/from **ASG-FE**; Deny internet
ASG-FE / ASG-API / ASG-DB	Logical grouping so Firewall/NSG rules stay readable

DNS Zone in Azure

Zone ke andar ye records hote hain:

Record Type	Kya kaam karta hai	Example
A Record	Naam → IP deta hai	`www.brarsite.com` → `52.168.1.1`
CNAME	Naam → Naam	`api.brarsite.com` → `backend.azurewebsites.net`
TXT	Info ya verify	Email sender verify, SPF, DKIM etc.
MX	Mail exchange	Mail server define karta hai
NS	Name servers	Ye batata hai ki zone ka master kaun hai
SOA	Start of Authority	Zone ka boss record
PTR	Reverse lookup	IP se naam dhoondhna

7. Ye sab record kya hote hain (simple examples):

Record Type	Matlab kya hai	Example
A	Naam → IP	`www.brarsite.com` → `20.1.1.4`
CNAME	Naam → Dusra naam	`api.brarsite.com` → `xyz.azurewebsites.net`
NS	Name server address	`ns1-01.azure-dns.com`
TXT	Text info (verify domain, SPF, etc.)	`"v=spf1 include:_spf.google.com"`
MX	Mail server specify karta hai	`10 mail.brarsite.com`
PTR	IP → Name (reverse lookup)	`20.1.1.4` → `myhost.brarsite.com`

DNS Concept	Real-life Analogy
Domain Name	Aadmi ka naam (`Google.com`)
IP Address	Aadmi ka phone number
DNS Zone	Ek diary jisme naam-number likhe hain
DNS Server	Ek teacher ya operator jo naam ka number batata hai
A record	Naam ka asli number
CNAME	Naam ka nickname
TXT	Notes / Verification
NS Record	Diary kahan rakhi hai ye info
Public DNS	Sabko dikhne wali diary
Private DNS	Sirf apni team ki diary

Feature	Azure VM (IaaS)	App Service (PaaS)	AKS (CaaS)
Deployment Model	Infrastructure as a Service	Platform as a Service	Container as a Service
Control over OS/Software	✅ Full	❌ Limited	🔄 Moderate (base node OS)
Suitable for	Legacy apps, custom software	Web apps, REST APIs	Microservices, CI/CD
Scaling	Manual or script-based	Auto scaling supported	Auto scaling with config
Learning Curve	Low	Very Low	High (Kubernetes knowledge)
DevOps Integration	Moderate	Easy (GitHub, DevOps)	Strong with Helm + CI/CD
CI/CD + Containers	Possible but manual	Supported (basic containers)	Built for containers
Cost	High (Pay per minute)	Medium (Optimized pricing)	Medium-High (but cost efficient)
Example	Windows legacy app	Shopping site, portfolio site	Netflix-type architecture

⚖️ ✅ COMPARISON TABLE

Feature / Service	ACI	App Service	AKS (Kubernetes)
Container Support	✅ Yes (1 container/pod)	✅ Yes (Docker-supported)	✅ Yes (full orchestration)
Use Case	Short-lived jobs, quick test	Web apps, APIs	Microservices, heavy apps
Orchestration	❌ No	❌ No	✅ Yes
Scaling	❌ Manual or Logic Apps	✅ Auto-scaling	✅ Auto, HPA, Cluster Autoscaler
DevOps Integration	❌ Minimal	✅ Strong (slots, GitHub)	✅ Very strong (Helm, GitOps)
Pricing	💸 Cheapest per-second	💰 Medium	💰💰 High but efficient at scale
Startup Time	⚡ Fast (seconds)	🕒 Medium (20–30s)	🐌 Slowest (cluster start ~ minutes)
Complexity	☆ Easy	☆☆ Medium	☆☆☆ Advanced
Networking/Ingress	Basic	Built-in	Advanced, Ingress + LB
Multi-container support	🚫 Not supported	🚫 Not supported	✅ Yes (Pods/Sidecars etc)