**AIRBNB SAMPLE CAPACITY EXTIMATION**

**DAU / MAU**

DAILY ACTIVE USERS (DAU) 10 MILL (PROPERTY OWNERS + GUESTS)
MONTHLY ACTIVE USERS (MAU) 100 MILL (PROPERTY OWNERS + GUESTS)

**THROUGHPUT**

**WRITES PER DAY**

- PO CREATE OR UPDATE PROPERTY
- G BOOK A PROPERTY

ASSUMPTIONS:
1 OF 50 USERS IS PO
1/5 * 10 MILL = 200K PO

9.8 MILL ARE G

BECAUSE 9.8 + 0.2 = 10 MILL

- EVERY PO CREATES OR UPDATES A PROPERTY ONCE A WEEK
- EVERY GUEST BOOKS A PROPERTY ONCE A MONTH

200K * 1/7 = **28K CREATE OF UPDATE REQUEST P DAY**
9.8M * 1/30 = **0.32M BOOKING REQUESTS P DAY**

**28K + 0.32M = 0.35M**
**0.35 MILL REQUEST PER DAY**

**READS PER DAY**

SEARCHING FOR PROPERTIES
ASSUME EACH SEARCH RETURNS 10 PROPERTIES
PROPERTY DATA 500KB
SO PER SERACH: 10 * 500KB = 5MB

TOTAL GUESTS 9.8M
1 SEARCH PER GUEST PER DAY
30% OF GUESTS SEARCH PROPERTIES DAILY
SO 3M SEARCH REQUESTS PER DAY

5MB * 3M SEARCH REQUESTS PER DAY = **15 TB PER DAY**

VIEWING PROPERTIES
PROPERTY LISTING 500KB
TOTAL GUESTS 9.8M

3 VIEWS PER GUEST PER DAY
20% OF GUESTS VIEW PROPERTIES
SO 6M READ REQUESTS PER DAY

500 KB * 6M VIEWING PER DAY = **3 TB PER DAY**

**TOTAL = 15 TB + 3 TB = 18 TB PER DAY**

**STORAGE**

PROPERTY DATA: IMAGES 450KB + DESCRIPTION 10KB + METADATA 40KB = 500KB

TOTAL STORAGE = 500KB * 28K REQUESTS P DAY = 14.3 GB P DAY
TOTAL STORAGE 10 YRS = 14.3 GB P DAY * 365 * 10 = 52 T B FOR 10 YEARS

BOOKINGS DATA: DATES + GUEST INFO + PROPERTY DETAILS = 1KB

TOTAL STORAGE = 1KB * 320K REQUESTS P DAY = 320 MB P DAY
TOTAL STORAGE 10 YRS = 320MB P DAY * 365 * 10 = 1.2 TB FOR 10 YEARS

**TOTAL 52 TB + 1.2 TB = 53.2 TB FOR 10 YEARS**

**TOTAL P DAY = 14.3 GB + 320 MB P DAY = 14.6 GB P DAY**

**MEMORY CACHE**

CACHE IS 5% OF STORAGE = 0.05 * 14.6 GB P DAY = 0.73 GB P DAY

**NETWORK BANDWITH**

INGRESS (DATA INCOMING PER SECOND) = 14.6GB P DAY / 24* 60 * 60 = 169KB P SECOND

EGRESS (DATA FLOWING OUT PER SECOND) = 18 TB P DAY / 24 * 60 * 60 = 200 MB PER SECOND

# Quick Estimation Guide for Storage Units (Bytes → KB → MB → GB → TB → PB)

This guide uses **rounded powers of 10** so you can do everything in your head during interviews or architecture planning.
It's intentionally approximate — don't worry about exact binary values (1024).

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## 1. The Core Mental Model

Instead of memorizing exact powers:

- **1 KB ≈ 1,000 bytes**
- **1 MB ≈ 1,000 KB**
- **1 GB ≈ 1,000 MB**
- **1 TB ≈ 1,000 GB**
- **1 PB ≈ 1,000 TB**

So each step up is **≈ ×1,000**, which is **≈ $\times 10^3$**.

This gives you the extremely useful rule:

### Each unit increase ≈ +3 zeros

| Unit | Approx value |
|---|---|
| 1 KB | $10^3$ bytes |
| 1 MB | $10^6$ bytes |
| 1 GB | $10^9$ bytes |
| 1 TB | $10^{12}$ bytes |
| 1 PB | $10^{15}$ bytes |

Easy:
**KB (3 zeros), MB (6), GB (9), TB (12), PB (15).**

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## 2. How to Convert Without Exact Math

### A. Bytes → KB (divide by ~1,000)

Examples:

- 10,000 bytes → **≈10 KB**

- 250,000 bytes → **≈250 KB**

Just **cut three zeros**.

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### B. KB → MB (divide by ~1,000)

- 2,000 KB → **≈2 MB**
- 75,000 KB → **≈75 MB**

Again, remove three zeros.

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### C. MB → GB

- 500 MB → **≈0.5 GB (half a gig)**
- 20,000 MB → **≈20 GB**

Same rule (÷1,000).

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### D. GB → TB

- 2,000 GB → **≈2 TB**
- 100 GB → **≈0.1 TB**

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### E. TB → PB

- 3,000 TB → **≈3 PB**
- 100 TB → **≈0.1 PB**

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## 3. Useful Shortcut for System Design

### If you know the GB/day → you know TB/month

**1 TB ≈ 1,000 GB**

So:

- Write volume = **50 GB/day**
- Monthly volume ≈ **1,500 GB ≈ 1.5 TB**

This is helpful when estimating logs, metrics, images, user uploads, etc.

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# 4. Power-of-10 Memory Tricks

### 1 GB ≈ a billion bytes ($10^9$)

Easy anchoring point.

So if someone says:

> This file is 200 million bytes.

You can answer:

> ≈ 0.2 GB (or 200 MB).

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### Typical object size mental anchors

- **1 KB** → small text file / JSON
- **100 KB** → "medium-sized" JSON or metadata blob
- **1 MB** → image
- **10 MB** → large image / small video chunk
- **100 MB** → video segment
- **1 GB** → entire movie
- **10–100 GB** → databases / backups

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# 5. Quick Approximate Conversion Table

| From | To | Shortcut |
|---|---|---|
| Bytes → KB | ÷ 1,000 | remove 3 zeros |
| KB → MB | ÷ 1,000 | remove 3 zeros |
| MB → GB | ÷ 1,000 | remove 3 zeros |
| GB → TB | ÷ 1,000 | remove 3 zeros |
| TB → PB | ÷ 1,000 | remove 3 zeros |

**Each step → divide by 1,000.**

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# 6. Putting It All Together (Example)

**System receives 8 KB messages, 100,000 per second.**
**How much data per day?**

Step 1: per second
100,000 msg × 8 KB = **800,000 KB ≈ 800 MB**

Step 2: per day
800 MB × 86,400 seconds ≈

800 ≈ $10^3$ MB
86,400 ≈ $10^5$

→ $10^3 \times 10^5 = \mathbf{10^8}$ **MB**

≈ **100,000 GB ≈ 100 TB/day**

That’s good enough as an interview answer.