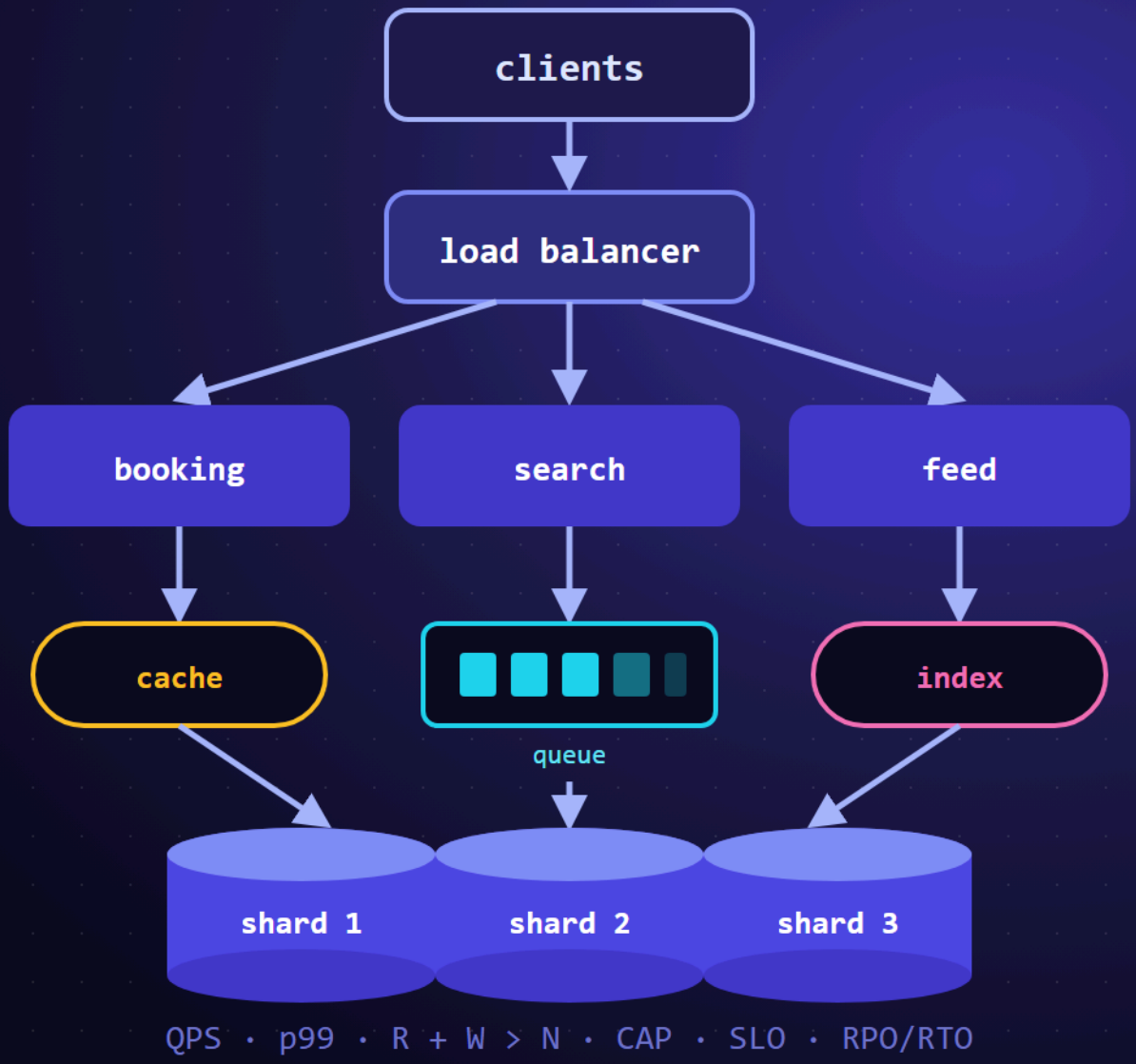


A PRACTICAL GUIDE

System Design Interview

From fundamentals to real-world architectures

A repeatable framework, estimation, core building blocks, and 10 complete designs worked end to end

SCALE · CACHING · SHARDING · QUEUES · CONSISTENCY

THENEXBOOKS

System Design Interview

A Practical Guide from Fundamentals to Real-World Architectures

First Edition

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A Practical Guide from Fundamentals to Real-World Architectures

First Edition, 2026

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Crowdline, the running example in this book, is fictional, as are all artists, venues, organizers, vendors, and people mentioned in its examples. Any resemblance to real companies or products is coincidental.

Preface

A system design interview is a strange conversation. In forty-five or sixty minutes, with a whiteboard or a shared drawing tool, you are asked to design something that real companies build over years with large teams: a URL shortener, a chat service, a news feed, a ticketing platform that survives a million fans arriving at once. Nobody expects a finished design. What the interviewer wants to see is how you think — how you clarify a vague problem, reason about scale with rough numbers, choose between imperfect options, and explain the trade-offs you are making.

That is also exactly what the job asks of senior engineers every week. The same skills that pass the interview — decomposing a problem, estimating load, picking the right data store, knowing when a cache helps and when it hurts, designing for failure — are the skills that keep production systems healthy. So this book has two goals at once: to help you perform confidently in system design interviews, and to give you a practical, durable understanding of how real-world architectures are built.

We start with the interview itself and a repeatable framework you can apply to any question. We then build up the core building blocks — networking, APIs, databases, caches, replication and partitioning, queues and streams, object storage and CDNs — and the distributed-systems concepts that tie them together: consistency, consensus, distributed transactions, idempotency, and scalability patterns. With that foundation in place, we work through the classic interview designs and then larger, real-world architectures, always explaining *why* a design choice fits and what it costs.

Who This Book Is For

- **Software engineers preparing for system design interviews** at mid-level, senior, and staff levels.
- **Backend and full-stack developers** who want to understand how large-scale systems really work beyond a single service and database.
- **Engineers moving into architecture or tech-lead roles** who need a shared vocabulary for trade-offs and capacity planning.
- **Interviewers** who want a consistent way to run and evaluate design conversations.

What You Will Learn

- How system design interviews are structured, what signals interviewers look for, and a step-by-step framework you can reuse on any question.
- Back-of-the-envelope estimation for throughput, storage, bandwidth, and latency — with the arithmetic shown.
- Networking, API styles, and how to choose among relational, key-value, document, wide-column, graph, and search stores.

- Caching, replication, partitioning, consistent hashing, message queues, event logs, stream processing, object storage, and CDNs.
- Consistency models, CAP and PACELC, consensus and leader election, unique ID generation, sagas, the transactional outbox, and idempotency.
- Complete designs for a URL shortener, a distributed rate limiter, notifications, chat and presence, a news feed, search and typeahead, a flash-sale ticket booking system, a payment ledger, video streaming, and proximity search.
- Reliability and observability, security, multi-region architecture, disaster recovery — and a full mock interview from start to finish.

How This Book Is Organized

Part I — Interview Foundations (Chapters 1–5) explains the interview, introduces our design framework, and covers estimation, networking, and API design. **Part II — Core Building Blocks** (Chapters 6–10) covers data stores, caching, replication and partitioning, messaging and streaming, and object storage and CDNs. **Part III — Distributed Systems Concepts** (Chapters 11–15) explains consistency, consensus, distributed transactions, idempotency, and scalability patterns. **Part IV — Classic Interview Designs** (Chapters 16–20) applies the framework to the questions you are most likely to be asked. **Part V — Real-World Architectures** (Chapters 21–25) tackles larger systems: search, flash-sale ticketing, payments, video streaming, and proximity search. **Part VI — Operating at Scale and the Capstone** (Chapters 26–28) covers reliability, observability, security, and multi-region design, and closes with a complete mock interview. The appendices provide a cheat sheet, interview templates and reference tables, a production readiness checklist, and a glossary.

Each chapter ends with a **Key Takeaways** box for quick review — ideal for the night before an interview.

The Running Example: Crowdline

Throughout the book we design **Crowdline**, a fictional live-events ticketing and fan platform. Fans discover concerts, sports, and theater events, buy tickets — sometimes alongside hundreds of thousands of other fans the moment a popular tour goes on sale — share events with short links, receive notifications, chat in event fan rooms, follow artists in an activity feed, search with typeahead, find venues nearby, and watch some shows via live stream. Organizers publish events and seat maps, and venues scan tickets at the door.

Crowdline is a deliberately rich example: almost every classic interview question appears somewhere inside it. Seeing the same product from many angles shows you how the pieces fit together in a real architecture, instead of as isolated puzzles. All scale figures for Crowdline are assumptions we state explicitly so you can follow — and challenge — the math.

Conventions

Algorithms and service sketches are written in Python 3, schemas in PostgreSQL-flavored SQL, APIs as HTTP requests with JSON bodies, and architecture diagrams as plain-text box-and-arrow drawings you can reproduce on any whiteboard. Product names are used as familiar examples of a category — the concepts transfer to whichever tools your team uses.

> **TIP**
> A recommended practice, or a way to present an idea effectively in an interview.

> **NOTE**
> Background information, a useful aside, or a follow-up question interviewers like to ask.

> **WARNING**
> A common mistake — in the interview or in production — that can cost you the offer or cause an outage.

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PART I

Interview Foundations

How system design interviews work and what they reward, a repeatable framework for any question, back-of-the-envelope estimation, the networking you need to reason about, and API design choices you can defend.

1 · How System Design Interviews Work
2 · A Repeatable Framework
3 · Back-of-the-Envelope Estimation
4 · Networking Essentials
5 · API Design for Interviews

CHAPTER 1 · PART I — INTERVIEW FOUNDATIONS

How System Design Interviews Work and What Interviewers Look For

A system design interview is not a quiz with one right answer. It is a short, structured conversation in which you show how you think about building software that has to serve many people reliably. In this chapter we take the format apart: what happens in the room, what interviewers are actually scoring, how expectations change with seniority, and how to prepare so that the forty-five minutes work for you instead of against you.

Why Companies Run System Design Interviews

Coding interviews test whether you can turn a well-defined problem into correct, efficient code. That skill matters, but it is only part of the job. Once you move beyond your first year or two as an engineer, much of your value comes from decisions that are made before any code is written: which components a feature needs, where data lives, what happens when a dependency is slow, and how the system will behave when traffic is ten times larger than today. Those decisions are expensive to reverse. A poorly chosen data model or a missing idempotency guarantee can cost a team months.

The system design interview is an attempt to observe that decision-making in a compressed form. The interviewer hands you an open-ended prompt — "design a ticketing system", "design a chat service", "design a URL shortener" — and watches how you turn ambiguity into a reasonable architecture. Because real systems are built by teams, the interview is also a proxy for collaboration: can you ask good questions, explain trade-offs clearly, take feedback, and change direction without getting defensive?

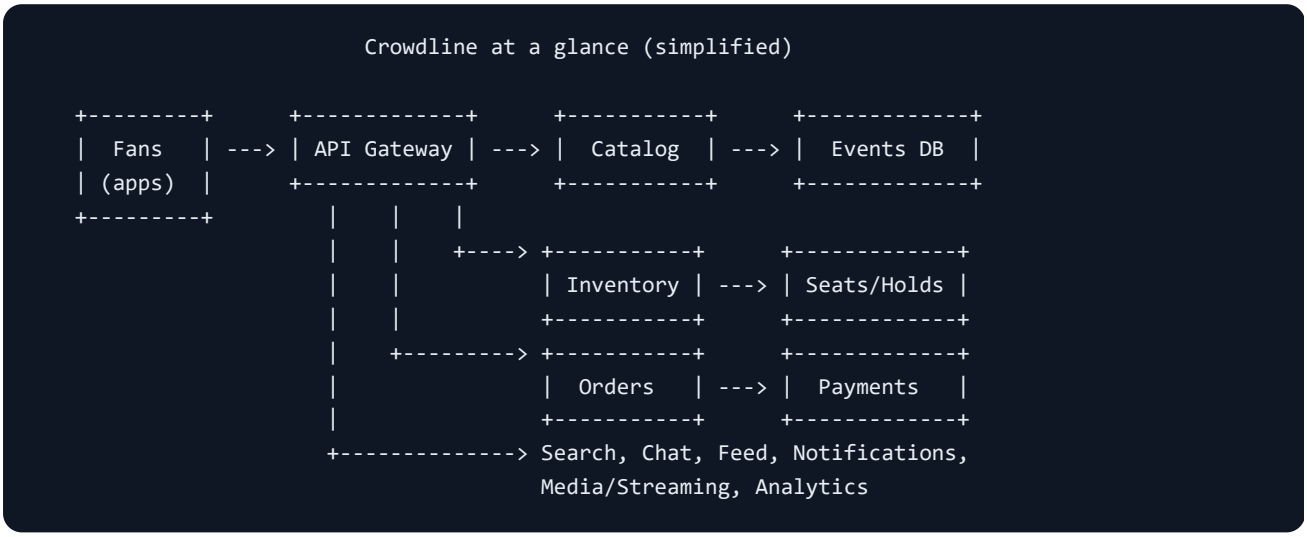
It helps to internalize one idea early: **the interviewer is not looking for the design**. There is no hidden answer key that says "the correct ticketing system uses exactly these seven boxes". There are designs that are clearly weak (a single database with no thought about contention during a flash sale), designs that are reasonable, and designs that are reasonable *and* well justified. Your goal is to land in the third group, and justification is the part most candidates underinvest in.

The Running Example: Crowdline

Throughout this book we use one fictional product so that concepts build on each other instead of resetting every chapter. **Crowdline** is a live-events ticketing and fan platform. Fans discover concerts, sports matches, and theater shows; buy tickets, sometimes during enormous "on-sale" moments when a popular artist releases seats; share events with short links; receive notifications; chat

with other fans in event rooms; follow artists and scroll an activity feed; search events with typeahead; find venues nearby; and watch some events via live stream. Organizers create events and seat maps, and venues scan tickets at the door.

We chose a ticketing platform because it naturally touches almost every classic interview topic. A flash sale for a band like the fictional *The Neon Tides* at the fictional *Harbor Arena* creates brutal contention on a small set of seats. Payments demand idempotency and careful bookkeeping. Share links are a URL shortener. Fan rooms are a chat system. The artist feed is a news feed. Event search is a search and typeahead problem. Nearby venues are geospatial. Live concerts are a media pipeline. When you see a prompt in a real interview, there is a good chance a piece of Crowdline maps onto it.



Do not worry about the details yet. By the end of the book you will be able to redraw this diagram from memory, explain every arrow, and defend each choice under questioning.

Anatomy of a Typical Interview

Formats vary between companies, but most system design rounds share a recognizable shape. A common length is 45 to 60 minutes, of which perhaps 35 to 45 minutes are spent on the design itself. The rest goes to introductions and to your questions at the end. The following timeline is a useful mental model for a 45-minute design slot; Chapter 2 turns it into a detailed, repeatable framework.

Phase	Rough time	What you are doing
Clarify the problem	5–8 min	Functional and non-functional requirements, scope
Estimate scale	3–5 min	Users, requests per second, storage, bandwidth
Define APIs and data	5–7 min	Key endpoints, core entities, access patterns
High-level design	8–10 min	Boxes and arrows that satisfy the requirements
Deep dives	10–15 min	Two or three hard parts, explored in depth
Wrap-up	2–3 min	Bottlenecks, failure modes, what you would do next

These numbers are guidance, not a stopwatch. Some interviewers skip estimation almost entirely; others will spend twenty minutes on a single deep dive because that is where they want to probe. What matters is that you **always know which phase you are in** and move forward deliberately. The most common failure mode we see is not a wrong answer — it is a candidate who spends twenty-five minutes on requirements and API minutiae and never reaches the interesting part.

The medium

You may draw on a physical whiteboard, a virtual whiteboard, or type into a shared document. Whatever the medium, practice with it beforehand and externalize your thinking. The interviewer cannot score what they cannot see or hear. A design that exists only in your head is, from their point of view, no design at all.

What Interviewers Actually Evaluate

Companies use different rubrics, but they tend to converge on a handful of dimensions. Understanding them lets you make sure each one gets evidence during the conversation. If a dimension receives no evidence, the interviewer cannot give you credit for it, no matter how capable you are.

1. Problem exploration and requirement gathering

Can you turn a vague prompt into a concrete, bounded problem? Strong candidates ask questions that change the design: "Do fans pick specific seats or just a ticket tier?", "What is the largest on-sale we must support?", "Is it acceptable for a fan to see a seat as available and then lose it at checkout?" Weak candidates either ask nothing and start drawing, or ask a long list of generic questions that do not affect any decision.

2. High-level design and decomposition

Can you break the system into components with clear responsibilities, and connect them in a way that actually satisfies the requirements? Interviewers look for sensible boundaries — for example, separating seat *inventory* from *orders* because they have very different contention profiles — and for data flowing along paths that make sense.

3. Technical depth

When the interviewer points at a box and asks "how does this actually work?", can you go deeper? Depth might mean explaining how a seat hold expires, how you prevent two fans from buying the same seat, how a cache is invalidated, or how a message queue guarantees ordering within a partition. Depth is where senior candidates separate themselves.

4. Trade-off reasoning

Every meaningful decision has a cost. Choosing strong consistency for seat inventory costs latency and availability during partitions; choosing eventual consistency for the activity feed costs occasional staleness. Interviewers listen for phrases like "we could do X or Y; X gives us this, Y gives us that; given our requirement for Z, I would pick X". A design with no stated trade-offs sounds like memorization.

5. Scalability, reliability, and operational awareness

Does the design survive growth and failure? Interviewers want to hear how you would scale reads and writes, what happens when a node dies, how you would detect problems in production, and how you would roll out changes safely. You do not need to cover all of it, but a design that ignores failure entirely is a red flag.

6. Communication and collaboration

Can the interviewer follow you? Do you check in, respond to hints, and adjust when new information arrives? Communication is not a soft extra; it is often the dimension that decides borderline cases. An interviewer who has to reconstruct your design from fragments will struggle to argue for you in a debrief.

Dimension	Weak signal	Strong signal
Requirements	Starts drawing immediately	Asks questions that change decisions
Decomposition	One giant "backend" box	Components with clear ownership
Depth	Buzzwords, no mechanism	Explains how it works step by step
Trade-offs	"X is best"	"X over Y because of requirement Z"
Reliability	Happy path only	Failure modes and mitigations
Communication	Long silences, jumps around	Signposts, checks in, adapts

> **NOTE**
>
> Rubrics are a tool for consistency, not a checklist to recite. Saying "and now I will address reliability" earns nothing by itself. Evidence comes from concrete statements: "If the Inventory service's primary fails, we promote a replica; holds created in the last few seconds might be lost if replication is asynchronous, so the hold table uses synchronous replication to one standby."

How Expectations Change with Seniority

The same prompt can be asked of a mid-level engineer and a staff engineer. What changes is the bar. Knowing roughly where the bar sits for your target level helps you decide how to spend your time.

Level	Typical expectation
Mid-level	A working end-to-end design; some depth when guided
Senior	Drives the conversation; deep dives unprompted; clear trade-offs
Staff and above	Frames the problem; spots the hardest risks early; weighs org and ops costs

For a **mid-level** role, an interviewer is usually satisfied if you produce a coherent design that meets the stated requirements, can explain your components, and respond sensibly when they steer you toward a problem area. It is fine if the interviewer leads more of the conversation.

For a **senior** role, you are expected to lead. You should identify the hard parts yourself — for Crowdline ticketing, the obvious one is thousands of fans trying to buy the same few thousand seats within seconds — and propose deep dives without waiting to be asked. Your trade-off discussions should reference the requirements you gathered earlier.

For **staff and principal** roles, interviewers look for judgment beyond the diagram. Can you tell which requirements are genuinely important and which can be relaxed? Do you consider operational cost, team ownership boundaries, migration paths from an existing system, and the risk of over-engineering? A staff candidate might say: "A virtual waiting room adds complexity, so I would only build it for on-sales we expect to exceed inventory by a wide margin; for ordinary events, direct checkout with row-level locking is enough."

> **TIP**
>
> If you are unsure what level you are being evaluated at, behave one level up in terms of ownership — drive the conversation and volunteer deep dives — while staying humble about uncertain details. Leading the discussion is almost never penalized; waiting passively for direction often is.

A Short Walkthrough: What a Good Opening Sounds Like

Abstract advice is easier to absorb with an example. Suppose the interviewer says: "Design the ticket purchasing flow for Crowdline." Here is a condensed version of how a strong candidate might open the conversation, followed by commentary.

```
Interviewer: Design the ticket purchasing flow for Crowdline.

Candidate:   Before I draw anything, I'd like to pin down scope. Is this reserved
             seating, where a fan picks seat A-12-07, or general admission tiers?
Interviewer: Reserved seating, with some GA sections.
Candidate:   Got it. And the hard case I'm thinking of is a big on-sale -- a
             popular artist, one arena, far more fans than seats. Should I
             design for that?
Interviewer: Yes, that's the interesting part.
Candidate:   Then I'll assume, say, 20,000 seats and up to 1 million fans arriving
```

```
              in the first few minutes. Two properties matter most: we must
              never sell the same seat twice, and the site must stay up even
              though most fans will be disappointed. Is it acceptable for a fan
              to hold seats for a few minutes while paying?
Interviewer:  Yes, a short hold is fine.
Candidate:    Great. I'll treat payments as an external provider and focus on
              inventory, holds, and handling the traffic spike. Let me write
              those requirements down and do a quick estimate.
```

Notice what happened in about two minutes. The candidate narrowed the scope (reserved seating), found the hard part (the on-sale spike), stated explicit assumptions as assumptions ("I'll assume, say, 20,000 seats"), named the two most important non-functional properties (no double-selling, availability under load), confirmed a key product decision (holds are acceptable), and explicitly deferred something (payments as an external dependency). Every one of those moves shapes the design that follows. None of them required deep technical knowledge — just a habit of asking what matters before building.

Contrast this with a weaker opening: "OK, so we'll have a load balancer, then some app servers, then a database — probably PostgreSQL — and a Redis cache." The components are not wrong, but nothing connects them to Crowdline's actual problem. The interviewer now has to drag the candidate back to requirements, and has already recorded a weak signal on problem exploration.

Signals That Hurt Candidates

It is useful to know the patterns that consistently lead to "no hire" feedback, because most of them are habits you can fix with practice.

- **Jumping to technology before understanding the problem.** Naming Kafka in the first minute says nothing about whether you need a log.
- **Buzzword stacking.** "We'll use microservices, Kubernetes, a service mesh, and CQRS" without explaining which requirement each one serves.
- **Single-path thinking.** Presenting one option as obviously correct, with no alternatives considered. Interviewers then ask "why not X?", and a candidate who has not thought about X appears shallow.
- **Going silent.** Long stretches of drawing without speaking. The interviewer loses track, and you lose the chance to be redirected early.
- **Ignoring hints.** When the interviewer asks "what happens if two fans click Buy on the same seat at the same moment?", they are telling you where to go. Brushing it aside is costly.
- **Over-engineering.** Designing for a hypothetical billion users when the stated scale is a few thousand requests per second, or adding five caching layers to a write-heavy system.
- **Defensiveness.** Arguing with the interviewer's constraints instead of adapting. It is fine to explain your reasoning; it is not fine to refuse a new constraint.

- **Fabricated precision.** Claiming exact numbers you cannot know ("Redis does exactly 1.2 million operations per second") instead of reasoning with rough, clearly labeled estimates.

> **WARNING**
>
> Do not recite a memorized design verbatim. Interviewers frequently modify well-known prompts precisely to see whether you notice. If you have memorized "the" URL shortener design and the interviewer adds "links must expire after 24 hours and we need per-link click analytics in real time", a recited answer will miss both changes — and the interviewer will notice.

Signals That Help Candidates

The positive patterns are mostly the mirror image of the negative ones, but a few deserve emphasis because they are easy to add once you know about them.

Signposting

Tell the interviewer where you are and where you are going. "The high-level flow is in place. Next I'd like to go deep on how we prevent double-selling, then on handling the on-sale spike. Does that match what you'd like to see?" This one sentence makes you look organized, gives the interviewer a chance to redirect, and makes it much easier for them to write feedback.

Naming assumptions explicitly

When you do not know something, pick a reasonable value, say it out loud, and move on. "I'll assume the average order is two tickets." If the interviewer disagrees, they will tell you. Stalling to ask about every number wastes time; silently assuming hides your reasoning.

Connecting decisions to requirements

The most persuasive sentence structure in a design interview is: "Because of requirement R, I choose X over Y, accepting cost C." For example: "Because we must never sell a seat twice, I'll make the seat status update a conditional write in the Inventory database rather than relying on a cache, accepting some extra latency on the hold step."

Showing mechanism

Instead of "we'll use a lock", explain the lock. A short, concrete sketch goes a long way. Here is the kind of snippet you might write on a whiteboard to show how a seat hold avoids double-booking with a single conditional update:

place_hold.sql

```
-- Atomically move seats from AVAILABLE to HELD for one user.
-- If any seat is not AVAILABLE, fewer rows are updated and the app aborts.
BEGIN;
```

```
UPDATE seat
   SET status = 'HELD', hold_id = 'h_9f2c'
 WHERE event_id = 'evt_1042'
   AND seat_id IN ('A-12-07', 'A-12-08')
   AND status = 'AVAILABLE';

-- Application checks: rows updated must equal 2; otherwise ROLLBACK.

INSERT INTO hold (hold_id, event_id, user_id, expires_at)
VALUES ('h_9f2c', 'evt_1042', 'usr_77', now() + interval '8 minutes');

COMMIT;
```

You would not need to write this in every interview, but being able to produce it when asked "how exactly do you prevent two fans holding the same seat?" is strong evidence of depth. It also naturally invites follow-ups — what if millions of requests hit the same rows? — which lets you steer toward topics you have prepared, such as the waiting room discussed in Chapter 22.

Acknowledging what you would do next

No design is finished in forty-five minutes. Ending with "Given more time, I would look at multi-region failover for the Inventory database, and I'd want load tests that replay a realistic on-sale" shows maturity. It tells the interviewer you know the boundaries of what you produced.

The Interviewer's Toolkit: Follow-Up Questions

Interviewers use follow-up questions to probe depth and to test whether your design holds together. Many of these questions recur across prompts. Preparing a thoughtful answer to each category means you are rarely caught off guard.

Follow-up type	Example for Crowdline
Scale up	What if the on-sale has 10x more fans?
Failure	What if the payment provider times out?
Consistency	Can two fans ever get the same seat?
Hot spot	One event gets most of the traffic. Now what?
Latency	How do we keep seat maps fast to load?
Evolution	How would you add resale of tickets later?
Cost	Which component dominates the bill?
Operations	How do you know the on-sale is going badly?

Let us look at how to answer two of these well.

"What if the payment provider times out?"

A weak answer: "We retry." A strong answer walks through the ambiguity. A timeout does not tell you whether the charge happened. If you blindly retry, you might charge the fan twice. The fix is to send an idempotency key with each charge request so that the provider (the fictional PayRail) recognizes the retry and returns the original result, and to keep the order in a `PENDING` state until a definitive answer arrives, either from the retry or from a later webhook or reconciliation job. Meanwhile, the seat hold should be extended or at least not released while the payment outcome is unknown, otherwise another fan might buy a seat that was actually paid for. Chapter 14 covers idempotency in depth and Chapter 23 builds the full payment flow.

"One event gets most of the traffic. Now what?"

This is a hot-spot question. If you partitioned seat data by `event_id`, one partition now receives most of the load. Good answers consider several layers: absorbing the spike before it reaches the database (a waiting room that admits fans at a controlled rate), serving the read-heavy seat map from a cache or precomputed snapshot rather than the primary database, and reducing contention on writes by partitioning inventory more finely within the event (for example, by section) so that holds on different sections do not compete. You would also mention that a single hot event is a known, scheduled phenomenon — the on-sale time is published in advance — so capacity can be pre-provisioned.

> **TIP**
>
> When you get a follow-up, restate it briefly before answering: "So the concern is that retries could double-charge. Let me handle that." This buys you a few seconds to think, confirms you understood the question, and makes your answer easier to follow.

Handling Hints, Pushback, and Changed Requirements

Interviewers often steer. Sometimes the steer is gentle ("interesting — how would that behave during an on-sale?"), sometimes direct ("I'm worried about the database here"). Treat both as valuable information. A hint means you are close to something the interviewer wants to evaluate. Follow it, even if it means pausing a thread you were enjoying.

Pushback is different from a hint. If the interviewer says "I don't think a relational database can handle this", they may be testing your conviction as much as your design. A good response neither caves immediately nor digs in stubbornly. Explain your reasoning with numbers — "at our assumed peak of around 5,000 hold attempts per second on one event, split across sections, a well-indexed PostgreSQL primary is plausible, but I agree it's close to the edge; if we need headroom, we could shard by section or front it with a queue" — and then ask whether they would like you to explore an alternative. You show that you can defend a position and also that you are open to evidence.

Changed requirements are a deliberate test of adaptability. Midway through, the interviewer might say "now tickets can be resold between fans". Do not restart from scratch. Identify which parts of your design are affected (ownership of tickets changes; the barcode must be reissued; the Orders service needs a new transfer flow), sketch the delta, and note new risks (fraud, price caps). Adapting cleanly is a strong senior signal.

Preparing Effectively

Preparation for design interviews is different from grinding coding problems: you are building a toolkit of concepts and a conversational habit. Learn the framework (Chapter 2) and estimation (Chapter 3) until they feel automatic, fill in the building blocks (Chapters 4–15), then study the classic designs as worked examples rather than scripts. Above all, practice out loud with a timer. If you have about a month, the following schedule is a reasonable default:

```
Week 1  Framework + estimation (Ch. 1-3). Five timed estimation drills.
        Networking and APIs (Ch. 4-5). Sketch Crowdline's public API.
Week 2  Data stores, caching, replication, partitioning (Ch. 6-8).
        Queues, storage, CDNs (Ch. 9-10). One mock: URL shortener.
Week 3  Consistency, consensus, transactions, idempotency, scaling
        (Ch. 11-15). Two mocks: rate limiter, notifications.
Week 4  Classic and real-world designs (Ch. 16-25), two per session.
        Reliability, security, multi-region (Ch. 26-27).
        Full mock with the capstone (Ch. 28). Review weak spots.
```

> **NOTE**
>
> Mock interviews with another person are disproportionately valuable. A partner interrupts, asks awkward follow-ups, and misreads your diagrams — exactly what a real interviewer does.

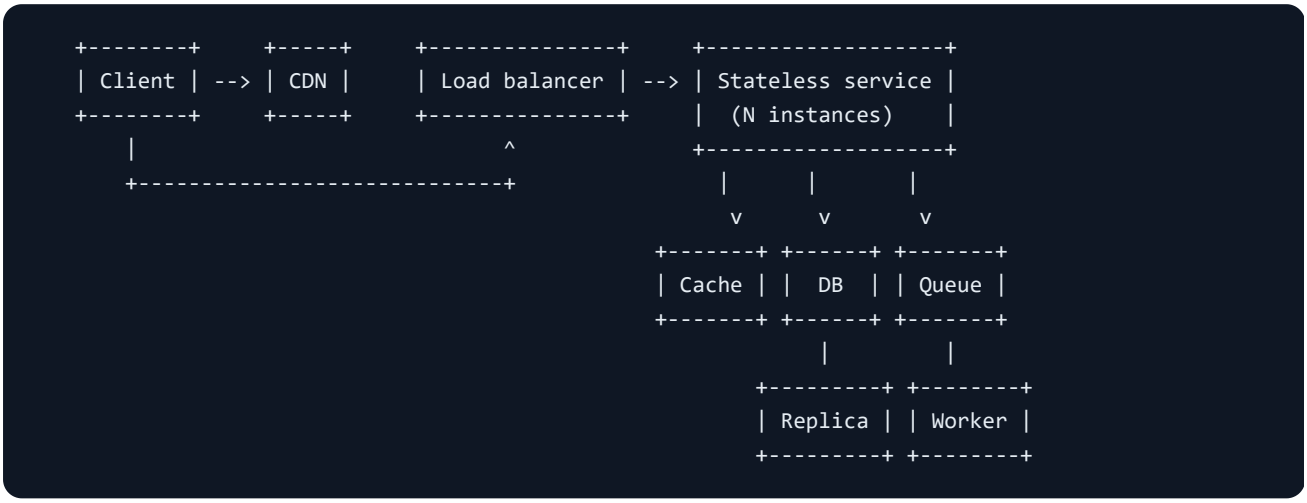
Building a Personal Toolkit

Strong candidates walk into the interview with a small set of well-rehearsed tools. None of them is a memorized design; they are reusable pieces of reasoning. Here is a starting list you can refine as you read the book:

- **A requirements checklist.** Users and actors, core use cases, scale, read/write ratio, latency targets, consistency needs, availability target, data retention, and anything explicitly out of scope.
- **An estimation cheat sheet.** Seconds per day (86,400, which you can round to roughly 100,000 for quick math), powers of two and ten, typical object sizes, and rough latency orders of magnitude.
- **A default architecture.** Clients, a load balancer or API gateway, stateless services, a primary data store with replicas, a cache, a queue for asynchronous work, object storage behind a CDN. Start here and modify.

- **A catalog of trade-offs.** SQL vs. NoSQL, push vs. pull, synchronous vs. asynchronous, strong vs. eventual consistency, cache-aside vs. write-through, and so on — each with the one-sentence reason you would pick either side.
- **A failure-mode checklist.** Node crash, network partition, slow dependency, hot key, thundering herd, retry storm, data corruption, bad deploy. For each, a mitigation you can explain.

To make the default architecture concrete, here is how it looks when you have not yet specialized it for any particular problem. You will see variations of this diagram throughout the book.



The value of a default is that it lets you start quickly and then spend your energy on what is different about this problem. For Crowdline ticketing, what is different is contention on inventory and the traffic spike. For fan chat, it is long-lived connections and fan-out. For the feed, it is the balance between precomputing and computing on read. Recognizing "what is different here" is itself a skill interviewers value.

A Glimpse of the Scoring Conversation

After your interview, the interviewer writes feedback, often within hours, and later discusses it with other interviewers in a debrief or submits it to a hiring committee. The written feedback usually contains a recommendation and evidence under each rubric dimension. Imagine an excerpt like this:

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Problem exploration: Strong. Clarified reserved vs. GA seating and identified
the on-sale spike as the core challenge within the first three minutes.

Technical depth: Strong. Explained seat holds with a conditional update and
hold expiry; discussed idempotency keys for payment retries unprompted.

Trade-offs: Mixed. Chose Redis for holds without discussing durability; when
asked, recovered well and moved holds to the primary database.

Communication: Strong. Signposted each phase; responded well to pushback.
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