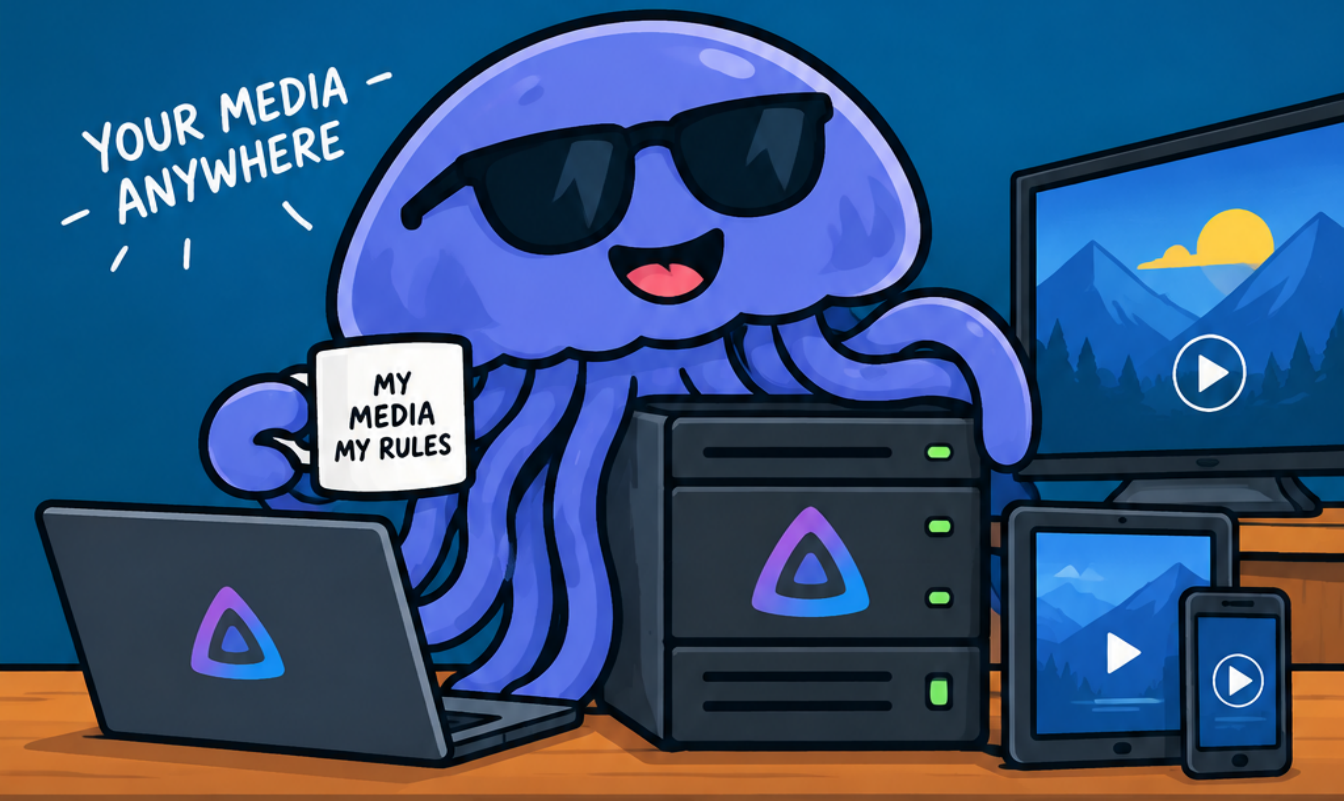
Jellyfin

Building a Self-Hosted Media Platform

A Complete Guide to Architecture, Deployment, Administration, and Optimization



ARCHITECTURE | DEPLOYMENT | ADMINISTRATION | OPTIMIZATION

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A Complete Guide to Architecture, Deployment, Administration, and Optimization

About this book: Jellyfin is the leading free and open source media server, yet running it well is harder than most people expect. This book is designed to take you from first principles through to a production grade deployment that can reliably serve your media library to multiple users, across multiple devices, both locally and remotely. Every chapter explains the reasoning behind each recommendation, the trade offs you will face, and the configurations that actually work in practice. Whether you are running Jellyfin on a single mini PC for yourself or managing a multi user media ecosystem across several homes, this book will give you the knowledge to make informed architectural decisions and the practical guidance to implement them correctly.

Introduction

There was a time when watching a movie at home meant putting a disc in a player, browsing the menu, and hitting play. You owned the copy. You could play it whenever you wanted. No subscription expired, no licensing deal fell through, no algorithm decided you had watched enough for this month.

Then streaming arrived. It was convenient. Netflix, Hulu, Disney Plus, Prime Video, Max, Apple TV Plus. The choice was enormous. The quality was excellent. For a few years, it was cheap enough to justify subscribing to several services. Then it was not.

By mid decade, a serious household could be paying well over fifty dollars a month across streaming subscriptions just to watch the content they used to access through a single cable package. Worse, the content keeps moving between services. A show you binged last year on one platform appears on another this year. Your watched history does not follow. Your recommendations reset. You feel like a guest in someone else library.

Self hosting your media is the response to all of this. You buy your own content. You store it on your own hardware. You stream it to your own devices through your own server. Nothing disappears because a licensing deal expires. Your metadata, your watch history, your collections remain under your control. You decide who can access it, from where, and on what terms.

Jellyfin is the tool that makes this practical.

Jellyfin is a free and open source media server. It runs on Linux, Windows, and macOS. It scans your media files, enriches them with metadata and artwork from services like The Movie Database, and serves them to any device on your network or over the internet. It supports hardware accelerated transcoding, so devices with limited codec support still get a smooth experience. It provides per user access controls, parental controls, watch progress tracking, and synchronized playback. None of these features are locked behind a paywall. There is no premium tier. There is no account to create. There is no telemetry sent to a central server.

This book exists because Jellyfin is not plug and play.

The official installation guides are minimal. The documentation is fragmented. The community forums are full of well meaning but sometimes contradictory advice. Someone tells you to install Jellyfin as a native package. Another person insists Docker is the only right way. A third recommends buying a specific mini PC with an Intel processor but cannot explain why the exact generation matters. You spend more time troubleshooting GPU passthrough in containers than you do watching your media.

I wrote this book to change that.

It is structured as a progression from fundamentals to mastery. We begin with the why: why self host, why Jellyfin specifically, and what trade offs you accept by choosing this path. We then move through the entire stack, from selecting hardware that can actually handle your workload, through storage architecture and filesystem choices, through operating systems and installation methods, through the intricate details of transcoding and hardware acceleration, through networking and remote access, through security and hardening, and finally through the day to day operations of keeping a Jellyfin deployment running reliably over months and years.

Every chapter is built around decisions you need to make. What is the difference between direct play, direct stream, and transcoding, and why should you care about any of them? Is Intel Quick Sync really better than NVIDIA NVENC for this use case, and is the official documentation correct about AMD GPUs being poor choices? Should you run Jellyfin natively or in Docker, and what does that choice mean for hardware acceleration and backups? Is exposing Jellyfin to the internet via a reverse proxy safe, or should you always use a VPN? How much disk space does the Jellyfin database actually need, and what happens if it runs out?

You will get specific answers to all of these questions. You will get configuration examples you can copy and adapt. You will get warnings about what not to do. Where there are legitimate disagreements in the community, you will get both sides of the argument and the reasoning behind each.

A few important notes before we begin.

First, this book prioritizes reliability over novelty. There are clever ways to run Jellyfin on a Raspberry Pi, or on Kubernetes in a homelab, or entirely on network attached storage. Some of these approaches are worth exploring. Others are engineering exercises disguised as practical advice. This book tells you when an approach is production ready and when it is a curiosity best left

to hobbyists.

Second, Jellyfin is a moving target. Versions are released frequently, and major changes happen. Version 10.11, released in late 2025, completely rebuilt the database layer. Version 12.0, released in September 2026, dropped the 10 prefix and introduced several breaking changes. I have written this book to be version aware, calling out where behavior changes between releases and where your configuration needs adjustment. Still, check the official documentation when you apply guidance from this book to ensure nothing has shifted since publication.

Third, some of this material will be dense. Transcoding pipelines, codec profiles, reverse proxy configurations, and GPU driver versions are not inherently simple topics. I have written them as clearly as I can, but you may need to slow down and reread sections. That is normal. Understanding these details is what separates a Jellyfin deployment that occasionally stutters from one that just works, every time.

If you are ready, let us start at the beginning.

Chapter 1: Why Self-Host Media? The Economics and Philosophy of Personal Media Servers

The Streaming Era and Its Limitations

The story of modern home entertainment is essentially the story of how we surrendered ownership in exchange for convenience.

Twenty years ago, movies and television were physical objects. You bought a DVD or Blu ray, and you could play it indefinitely. The quality was fixed at the point of purchase. A 1080p Blu ray was always 1080p. There was no dynamic bitrate adjustment, no upscaling, no 4K remaster that replaced your copy without your consent. There were limitations: discs scratch, players break, and physical media takes up space. But the fundamental relationship was clear. You owned the content.

Streaming changed everything. When Netflix launched its streaming service, it was genuinely revolutionary. Unlimited movies and television for a flat monthly fee, instantly accessible on any device with an internet connection, was a value proposition that physical media could not match. The initial content library was smaller than what a serious collector might own, but the convenience was enormous.

The streaming ecosystem expanded rapidly. As content owners recognized the value of direct to consumer distribution, they launched their own services. Disney Plus brought together Disney, Pixar, Marvel, Star Wars, and National Geographic. HBO Max offered the prestige of HBO originals alongside Warner Bros catalog. Apple TV Plus invested heavily in high budget productions. Each service brought something unique, and each required its own subscription.

The economics quickly became unsustainable for all but the most dedicated cord cutters. By the mid 2020s, a household subscribing to Netflix, Disney Plus, Max, Prime Video, and Apple TV Plus was paying over fifty dollars monthly.

That is six hundred dollars a year. That is more than the cost of buying a Blu ray player and building a substantial physical library over the same period. And unlike physical media, none of that investment is retained. Cancel a subscription and all access vanishes.

Content rotation is another silent cost. Streaming libraries change constantly. A show available on one platform today may move to another next year, or become unavailable entirely when licensing agreements expire. The streaming model depends on perpetual churn to justify ongoing subscriptions. If the library were static, viewers would eventually watch everything and cancel. Instead, platforms constantly swap content to maintain the illusion of infinite choice.

Recommendation algorithms add a psychological dimension. Every streaming service optimizes to keep you watching its content. This means prioritizing originals over licensed content, pushing you toward shows designed to be binge watched, and hiding content that might cause you to realize there is nothing you want to watch. You do not own your watch history. You cannot export it. You cannot analyze it. When you leave a platform, you lose all trace of what you consumed there.

Self hosted media reverses every one of these dynamics.

Cost Analysis: Commercial Services vs Self-Hosted Infrastructure

The first question any self hosting candidate should ask is whether the economics make sense.

On the commercial side, the numbers are straightforward. A family subscribing to three major streaming services pays approximately forty to sixty dollars per month, or four hundred eighty to seven hundred twenty dollars per year. Over five years, that is two thousand four hundred to three thousand six hundred dollars. None of this generates assets. When you stop paying, you stop watching.

On the self hosted side, the costs are upfront rather than recurring, and they generate assets that can last for a decade or more.

Consider a modest Jellyfin deployment. An Intel N100 based mini PC costs approximately two hundred dollars. These systems feature integrated Intel

UHD Graphics with Quick Sync Video support capable of handling multiple 4K transcoding streams. Add two terabytes of NVMe storage for the operating system and Jellyfin configuration, and four or eight terabytes of mechanical storage for your media library, and you are looking at four hundred to five hundred dollars in initial hardware. Add electricity, which for a low power system running continuously is perhaps one hundred fifty to two hundred dollars annually, and you have the full cost picture.

After year one, the self hosted setup has already cost less than two years of streaming subscriptions. After year two, it is essentially break even against three years of subscriptions, with a fully funded personal media library that continues growing. After five years, even accounting for electricity and occasional hardware replacement, the self hosted approach has cost roughly half what commercial streaming would have consumed.

This analysis assumes you are acquiring media legally. Physical media purchases, digital downloads from authorized retailers, or content you have created yourself all contribute to your library. The initial investment in media is real, and it varies enormously depending on your tastes and collection ambitions. But unlike streaming subscriptions, which expire the moment you stop paying, your media purchases are permanent. They are assets.

There is also a hidden cost of commercial streaming that is difficult to quantify but real: fragmentation. With self hosted media, all your content is in one place, indexed by one system, searchable with one interface. With commercial streaming, you are perpetually switching between apps, each with its own interface, its own search algorithm, its own recommendation engine. The cognitive overhead of managing multiple subscriptions and multiple interfaces is a tax that self hosting eliminates.

The one area where commercial streaming still holds an advantage is new release access. Streaming services have licensing deals that bring films and shows to viewers within weeks or months of theatrical or network release. Building a physical or digital library requires waiting for releases and purchasing them individually. If you watch primarily freshly released content, streaming remains the practical choice. If your watching habits include a significant portion of catalog content, older films, classic television, or content that frequently rotates between services, self hosting becomes more attractive.

For most serious media consumers, a hybrid approach makes sense. Maintain subscriptions for content you cannot reasonably acquire yourself, while

self hosting the catalog that matters to you. Jellyfin can even integrate with some external services, providing a unified interface.

Privacy, Ownership, and Control Over Your Media

Price is not the only reason people self host.

Commercial streaming services collect extensive data about your viewing habits. This data drives recommendations, yes, but it also drives advertising, licensing negotiations, and content production decisions. Your watch history reveals your interests, your political leanings, your cultural background, your family dynamics. This data is aggregated, analyzed, and sold. Even if you never directly purchase from the ad market, you are the product.

Jellyfin changes the relationship. All data stays on your server. Watch history, metadata preferences, user profiles, playlists, everything is stored locally. Jellyfin does not send telemetry to central servers. It does not build a profile of your viewing habits. It does not share your data with advertisers. The only external connections are to metadata providers like The Movie Database, and those connections are read only. You request information about a film. TMDb returns the information. Neither party builds a profile of your tastes.

Ownership is a related but distinct concern. When you subscribe to Netflix, you are licensed to watch content under terms controlled by Netflix and its content partners. Those terms can change at any time. Content can be removed. Your access can be revoked. When you own a copy of a film, either physically or as a legitimate digital purchase, you control access to that copy. Jellyfin does not verify licensing. It does not check whether your content is authorized. It treats all media files equally, whether they are home videos, legally purchased downloads, or ripped Blu rays. This neutrality is philosophically important to many self hosting advocates. The server is a tool, not a gatekeeper.

Control extends to access management as well. Jellyfin provides granular user management. You can create separate accounts for family members, each with their own watch history, preferences, and permissions. You can set parental controls based on content ratings. You can restrict remote access to specific users. You can define local network ranges so that some users have full access at home while others are limited. None of this requires

contacting customer support or navigating complex settings. It is immediate, configurable, and entirely under your control.

There is also the matter of quality. Streaming services use variable bitrate encoding, which means quality fluctuates based on network conditions and storage budget. A highly compressed scene might look acceptable until it is filled with fast motion or fine detail, at which point compression artifacts become obvious. Self hosted media preserves the quality of your source files. A 100 gigabyte Blu ray rip remains 100 gigabytes. The bitrate, the audio tracks, the subtitles, the special features, all are preserved. Your viewing experience matches the intent of the source material.

The Self-Hosting Landscape: Plex, Emby, Jellyfin Compared

Jellyfin does not exist in a vacuum. Two other major self hosted media platforms compete for the same audience: Plex and Emby. Understanding the differences between them is essential to making an informed choice.

Plex is the most well known of the three. It launched in 2009 and built a massive user base through aggressive marketing and exceptionally polished client applications. Plex runs on virtually every platform, from dedicated servers to smart TVs, gaming consoles, and mobile devices. The user experience is seamless, and the client quality is genuinely excellent. Plex also offers DVR functionality for live television, podcasts, music streaming, and a rich ecosystem of third party plugins.

Plex has significant limitations, however. First is cost. Plex operates on a freemium model. The core media server is free, but hardware transcoding, mobile downloads, and several other important features require a Plex Pass subscription at approximately five dollars per month or one hundred twenty dollars as a lifetime license. For a self hosting enthusiast who values control, paying for a feature that should be included is a philosophical problem.

Second is privacy. Plex routes much of its operation through central servers. Server discovery, remote access, friend lists, activity feeds, and some transcoding operations all touch Plex infrastructure. This is what makes Plex so easy to set up. You do not need to configure port forwarding or manage DNS. Plex handles it all. But it also means Plex has visibility into your server

and your usage patterns. The privacy implications are real, and they matter to many self hosting users.

Third is the platform direction. Plex Media Server has gradually become more closed. Features that were once available to all users have been moved behind the Plex Pass paywall. The company has experimented with subscription based streaming content built into the Plex client, blurring the line between a self hosted media server and a Netflix competitor. The trajectory is clear: Plex is optimizing for corporate growth, not user empowerment.

Emby occupies a middle ground. It launched in 2014 as an open source project and maintained that status until 2018, when the project closed its core codebase and introduced a subscription model. Emby is similar in functionality to Plex, with support for hardware transcoding, DVR, and a wide range of client applications. The Emby Premiere subscription at approximately four dollars per month unlocks hardware transcoding, mobile downloads, and other premium features.

Emby is less aggressive than Plex about centralization. Remote access is optional, and much of the operation can be kept entirely local. The user interface is clean and functional. However, the closure of the codebase alienated a significant portion of the original community, and the project has not fully recovered. Some features are locked behind Emby Premiere, and the development pace has been slower than Plex.

Jellyfin was born from this dissatisfaction. In December 2018, shortly after Emby closed its source code, developers Andrew Rabert and Joshua Boniface forked the last open source version of Emby, version 3.5.2. The goal was explicit: create a media server that remained truly open source, with no premium tiers, no central servers, and no vendor lock in. The project was named Jellyfin after a childhood candy.

The technical foundation required significant work. Emby was built on the Microsoft .NET Framework, which limited it to Windows. Jellyfin was ported to .NET Core, enabling full cross platform support on Linux, macOS, and Windows. The codebase was reorganized to remove vendor specific dependencies. A plugin system was designed to support community contributions. Client applications were developed for major platforms.

By 2026, Jellyfin has matured into a serious competitor. Version 10.11, released in October 2025, introduced a complete database overhaul using Entity Framework Core, enabling better data integrity, native backup and

restore, and improved performance. Version 12.0, released in September 2026, modernized the user interface, upgraded to FFmpeg 8.1, and introduced several breaking changes to clean up the API. The project has over eighty GitHub repositories, an active developer community, and a growing user base.

Jellyfin is not without weaknesses. The client ecosystem, while comprehensive, is not as polished as Plex. Some smart TV apps are rough around the edges. The official Android app, for instance, lacks certain features present in third party alternatives like Litefin. Documentation is improving but still has gaps. The learning curve is steeper than Plex because you are responsible for more of the infrastructure. Remote access is not automatic and requires configuration.

But these weaknesses are the price of the advantages. Everything in Jellyfin is free, forever. There are no premium features. There is no central server. There is no telemetry. The code is open. Anyone can audit it, modify it, contribute to it. The project is volunteer driven, which means development can be unpredictable, but it also means the priorities align with users, not shareholders.

If you want convenience above all, Plex may be the right choice. If you want a middle ground between convenience and control, Emby may work for you. If you value privacy, ownership, and long term sustainability, Jellyfin is the best option available.

What This Book Covers and How to Use It

This book is designed to be both a learning resource and a reference. It is organized as a progression from fundamentals to advanced operations.

The early chapters establish the foundation. You will learn about Jellyfin architecture, hardware requirements, storage design, and operating system choices. These chapters are written so that someone with minimal technical experience can follow them, but they go deep enough that experienced users will find meaningful content.

The middle chapters cover deployment and configuration. Installation methods, initial setup, media libraries, metadata management, user configuration, transcoding, and hardware acceleration are all covered in detail. Each chapter explains not just what to do but why, so you can adapt the guidance to your specific situation.

The later chapters address operations, security, and optimization. Remote access, reverse proxies, TLS, security hardening, monitoring, performance tuning, automation, backups, migrations, and long term maintenance are all covered. These chapters assume you have a working deployment and are looking to make it reliable, secure, and efficient.

You do not need to read this book linearly. If you already understand media server fundamentals, you can skip to the chapters relevant to your situation. If you are planning a new deployment, reading from the beginning will help you avoid mistakes that are expensive to fix later.

Throughout the book, you will encounter configuration examples. These are written for realism and correctness. They include explanations of important parameters and warnings about security implications. Copy them, but read them first. Understand what each setting does and whether it is appropriate for your environment.

Version sensitivity is handled carefully. Jellyfin changes, and configurations that work for one version may not work for another. Where behavior varies by version, I note it explicitly. If a configuration method has been deprecated or replaced, I tell you. But you should always verify against the official documentation when applying guidance from this book.

Let us begin.

Chapter 2: Understanding Jellyfin: Architecture, Philosophy, and Capabilities

Project History, Governance, and the Open-Source Commitment

To understand Jellyfin as a platform, you need to understand it as a project.

Jellyfin began on December 8, 2018. The trigger was a decision by the Emby team to close the source code of their media server, transitioning from the open source version 3.5.2 to a proprietary version 4.x line. For users who valued transparency, modifiability, and community ownership, this was a breaking change. Co founders Andrew Rabert and Joshua Boniface, along with other contributors, forked Emby 3.5.2 and began work on a media server that would remain open source in perpetuity.

The first release, version 10.0.0, was issued in January 2019. The version numbering was intentional. Emby was on version 3.x. Jellyfin started at 10.0.0 to signal that it was not a continuation of Emby but something new. The unique numbering scheme would later cause some confusion when Jellyfin simply incremented to 11.0 and then 12.0, abandoning the leading zero that had distinguished it.

The technical challenges were substantial. Emby was built on the .NET Framework, which was Windows only. Jellyfin needed to run on Linux, the preferred platform for media servers. The project was ported to .NET Core, Microsoft cross platform runtime, which enabled deployment on Linux, macOS, and Windows. This porting effort consumed the first year of development.

By late 2019, Jellyfin was functional but rough. The server worked. Basic client applications existed. Hardware acceleration was incomplete. Documentation was sparse. But the core promise was real: a fully open source media server with no premium tier, no central servers, and no vendor lock in.

Development accelerated through 2020 and 2021. Version 10.6 introduced SyncPlay, allowing synchronized group viewing. Version 10.7 improved hardware acceleration and client compatibility. Version 10.8 added Dolby Vision tone mapping. Each release brought Jellyfin closer to feature parity with Plex and Emby, while maintaining the open source commitment.

Version 10.9 and 10.10 continued refinement. AV1 encoding support was added. The database layer received improvements. Client applications matured. By 2024, Jellyfin was a credible alternative for anyone willing to accept a slightly steeper learning curve in exchange for true openness.

Then came version 10.11, released October 19, 2025. This was the most significant release in Jellyfin history. The database was completely rebuilt using Entity Framework Core, replacing the legacy SQLite schema that had been inherited from Emby. The new database enabled relational integrity, data deduplication, and native internal backup and restore support. The release upgraded to FFmpeg 7.1, improving codec support and performance. It removed ARM 32 bit support, requiring ARM 64 for all ARM deployments. It deprecated internal TLS support, signaling that users should use reverse proxies for HTTPS instead. Initial migration to 10.11 could take hours for large libraries, and the migrations were irreversible. There was no downgrade path.

Version 12.0, released September 8, 2026, dropped the leading 10 from the version number and introduced several breaking changes. The internal emby and mediabrowser API route prefixes were removed. Legacy authorization was disabled by default. Several obsolete APIs were eliminated. FFmpeg was upgraded to 8.1. The web client switched to a modern layout by default. The server now targets .NET 10. These changes cleaned up technical debt but required users to update their configurations and any custom scripts that relied on deprecated endpoints.

Governance has been a persistent challenge. Jellyfin is volunteer driven, with no paid contributors and no corporate backing. Funding comes through Open Collective donations and merchandise sales. The core team has grown and changed over the years. By 2026, the project leadership included Bond 009, Claus Vium, Bill Thornton, Cody Robibero, and Niels van Velzen. Joshua Boniface, one of the original co founders, stepped down in July 2026, raising questions about project continuity. The transition was handled through community governance structures, but the event highlighted the risks inherent in volunteer projects.

These risks are real. Development can slow when volunteers are unavailable. Features may be delayed indefinitely if no one has the expertise or interest to implement them. The governance model means decisions are made through discussion and consensus, which can be slow. But the rewards are equally real. No corporate owner can change the license, introduce a premium tier, or sell user data. The project belongs to its community. That alignment of incentives is philosophically important and practically meaningful.

Server Architecture and Core Services

Jellyfin is a client server application. The server runs on your chosen hardware, scans and indexes your media files, manages user accounts and permissions, handles authentication, and serves media to connected clients. Clients connect to the server over HTTP or HTTPS, browse the library, and request media streams.

The server is written in C# and runs on .NET. This architecture enables cross platform deployment while maintaining performance. The core server process handles several major subsystems:

The media library subsystem scans media directories, identifies files, extracts metadata using ffprobe, matches content to external databases like The Movie Database, downloads artwork, and maintains an internal database of all library information. Library scanning can occur automatically on a schedule, in response to file system changes, or manually through the dashboard. For large libraries, scanning can take significant time, especially if hardware acceleration is being used to extract preview frames.

The database subsystem stores all application data. Since version 10.11, Jellyfin uses Entity Framework Core with SQLite, storing everything in a single jellyfin.db file. This includes library metadata, user accounts, watch history, collections, playlists, system configuration, and trickplay data. The database is the heart of Jellyfin. If it is lost or corrupted, your library indexing and user data are lost, though your media files remain untouched. Backups are essential.

The transcoding subsystem handles media conversion. Jellyfin uses a customized build of FFmpeg called jellyfin-ffmpeg for all transcoding operations. When a client requests media that it cannot play directly, Jellyfin can transcode the video, audio, or both on the fly. This subsystem can leverage hardware acceleration via Intel Quick Sync, NVIDIA NVENC, AMD AMF or VA API, or Apple

VideoToolbox. Transcoding is CPU and GPU intensive, and proper hardware selection is critical for performance.

The networking subsystem manages client connections. Jellyfin exposes HTTP on port 8096 by default and HTTPS on port 8920. It supports WebSocket connections for real time updates, such as play state synchronization and library change notifications. The subsystem handles authentication tokens, rate limiting, and proxy forwarding headers. For reverse proxy deployments, proper configuration of the known proxies list is essential for correct client IP detection.

The plugin subsystem extends Jellyfin functionality. Plugins are C# assemblies loaded at runtime. Official plugins include metadata providers for TheTVDB and AniDB, a DLNA server, parental controls, and activity log management. Third party plugins add features like two factor authentication, collection management, and automation. Plugins can be installed from the official repository or manually from GitHub.

The authentication subsystem manages user accounts and access control. Jellyfin supports username and password authentication, with optional two factor authentication via the JellyfinSecurity plugin. It supports API keys for programmatic access. It provides role based permissions, allowing administrators to control what each user can see and do. The subsystem also handles quick connect for device authorization and trusted device tokens.

Understanding this architecture is important because it informs your deployment decisions. The database needs fast storage, preferably an SSD. Transcoding needs a capable GPU. Networking needs sufficient bandwidth. Each subsystem has different resource requirements, and a well designed deployment accounts for all of them.

The Jellyfin Protocol and API Surface

Jellyfin communicates with clients through a REST API and WebSocket connections. The API is documented but not always complete. Several SDKs exist in TypeScript, Python, Kotlin, and other languages. The API is organized around resource endpoints: users, libraries, items, sessions, system, and more.

Authentication is token based. Clients authenticate using the Users/AuthenticateByName endpoint, providing a username and password. The server

returns an access token that is used in subsequent requests via the Authorization header with the MediaBrowser scheme or via the X-MediaBrowser-Token header. API keys provide a similar mechanism for non interactive access.

Session management is handled through the Sessions endpoint. The server tracks active sessions, including device information, client type, last activity time, and current play state. Administrators can terminate sessions remotely.

The Items endpoint provides access to library content. Items can be queried, filtered, and sorted. Each item includes metadata like title, overview, runtime, rating, and provider IDs linking to external databases. The endpoint supports pagination and returns items in JSON format.

The System endpoint provides server information and administrative functions. It can be used to query server version, status, and configuration. It supports library scanning, system updates, and maintenance tasks. Some endpoints require administrator privileges.

Version 12.0 introduced breaking changes to the API. The emby and mediabrowser route prefixes were removed, which affected legacy clients and custom scripts. Several obsolete endpoints were eliminated, including CriticReviews and EasyPassword. Sorting by name now uses the SortName field for consistency. If you have scripts or integrations that depend on the API, you need to verify compatibility after major upgrades.

WebSocket connections are used for real time features. The server maintains a socket connection at the socket endpoint, sending events for play state changes, library updates, and system notifications. Reverse proxies must explicitly allow WebSocket connections, or real time features will fail.

The API is powerful but undocumented in many areas. Some endpoints are internal and may change without warning. If you build integrations against the Jellyfin API, test them thoroughly after each server upgrade.

Supported Media Types, Codecs, and Container Formats

Jellyfin can serve almost any media format, but not all formats are equal in terms of compatibility. The goal is direct play, where the client receives the original file without any server side processing. Direct play requires the client to support the video codec, audio codec, container format, and subtitle format of the source file. If any element is unsupported, Jellyfin must transcode or remux.

Video codecs: H.264 is universally supported. Every modern device, browser, and operating system can play H.264 8 bit video. This is the safest choice for maximum compatibility. HEVC, also known as H.265, is widely supported on modern devices, including iOS, Android TV, Roku, and recent browsers. It offers better compression than H.264, which is important for 4K content. AV1 is the newest codec, offering even better compression, but client support is still incomplete. Windows requires a codec extension. Firefox adds HEVC and AV1 support in version 134 and later. VP9 is supported on many platforms but not on iOS.

Audio codecs: AAC is the most widely supported. FLAC and Opus are also broadly compatible. AC3 works on most devices but fails in Firefox. DTS is problematic in web browsers but supported by TV and desktop applications. TrueHD and Dolby Atmos are high quality formats used on Blu rays, but very few devices can decode them without transcoding or passthrough.

Container formats: MP4 is the most compatible container. It is natively supported by every platform and browser. MKV is popular for Blu ray rips because it supports multiple audio tracks, multiple subtitle tracks, and high quality codecs without restriction. However, MKV is not natively supported by all browsers and often requires remuxing to HLS or TS. AVI and MOV are legacy formats that are rarely used for new content.

HDR formats: HDR10 is widely supported on HDR capable displays. HDR10 Plus is a dynamic metadata variant that works on Samsung and some other TVs. Dolby Vision is the most complex. It exists in multiple profiles. Profile 5 is a standalone stream. Profile 8 contains an HDR10 fallback layer. Profile 8.1 is a common format in modern releases. Jellyfin can tone map Dolby Vision to SDR using hardware acceleration, but direct Dolby Vision playback requires a compatible display and client.

Subtitle formats: SRT is universally supported. VTT is similar and works well in web clients. ASS and SSA support advanced styling but are not supported by all clients. PGS, used on Blu rays, requires conversion for most clients. Subtitle burn in is the process of permanently embedding subtitles into the video stream. It is CPU intensive and should be avoided if possible.

The practical recommendation is straightforward. For maximum compatibility, store your library as MP4 or MKV with H.264 8 bit video and AAC audio. For 4K content where file size matters, HEVC is the better choice, understanding that some older clients may need transcoding. Avoid obscure

codecs and containers unless you have a specific reason to use them.

Known Limitations and Design Trade-offs

Jellyfin is excellent but not perfect. Understanding its limitations helps you work around them and set realistic expectations.

Dolby Vision support is incomplete. Jellyfin can tone map Dolby Vision to SDR for non HDR displays, which is essential functionality. But it cannot pass Dolby Vision metadata through to compatible displays in all cases. Profile 5 content may not play correctly without transcoding. Profile 8.1 color rendering issues have been reported. If Dolby Vision is important to you, test your specific setup carefully.

Metadata quality depends on external sources. Jellyfin relies on TMDb, OMDb, and other providers for metadata. If the source data is wrong, incomplete, or missing, Jellyfin metadata will be wrong, incomplete, or missing. There is no magic fix for this. You can manually correct metadata, use NFO files, or switch providers, but you cannot escape the limitations of the source data.

Client ecosystem gaps exist. Jellyfin has official clients for major platforms, but some are less polished than others. The Android TV client has improved but still has quirks. The web client is generally good but lacks features present in desktop clients. Smart TV apps for Samsung Tizen and LG webOS exist but are not as refined as Plex apps. Third party clients like Litefin and Swiftfin often provide better experiences than official apps, but they are maintained by volunteers and may be abandoned.

Internal TLS is deprecated. Jellyfin used to support internal HTTPS. This was deprecated in 10.11 and is expected to be removed entirely. Users must now use reverse proxies for HTTPS. This is not a bad requirement. Reverse proxies are the correct way to expose web services. But it does mean more infrastructure to manage.

Database migration is irreversible. Jellyfin does not support downgrading. When you upgrade to a new major version, database migrations run automatically. These migrations are one way. If you upgrade and the new version does not work for you, you cannot downgrade. You must restore from a backup. This is a fundamental design decision. It simplifies the codebase but requires careful backup practices.

Performance at scale is untested. Jellyfin is designed for home and small business use. There is limited public information about how it performs with hundreds of concurrent users or petabyte scale libraries. For typical home and homelab deployments, performance is excellent. For larger deployments, you should test before relying on it.

These limitations are not fatal. They are trade offs inherent in a volunteer driven open source project serving a specific use case. Jellyfin excels at its primary mission: providing a free, open, private media server for individuals and households. It does not try to be everything to everyone.

Version History and Release Cadence

Jellyfin follows a versioning scheme that has evolved over time. Early versions used the format 10.Y.Z to distinguish from Emby. Version 12.0 dropped the leading 10. The current scheme is X.Y.Z where X is major, Y is minor, and Z is patch.

Major releases introduce breaking changes. Version 10.11 rebuilt the database. Version 12.0 removed deprecated APIs and changed API routing. Major releases require careful preparation. Backup before upgrading. Read the release notes. Test on a non production instance if possible.

Minor releases add features without breaking changes. Version 10.8 added Dolby Vision tone mapping. Version 10.9 added AV1 encoding. Minor releases are generally safe but should still be tested.

Patch releases fix bugs and security vulnerabilities. Version 10.11.10 patched three security vulnerabilities. Patch releases should be applied promptly.

The release cadence is roughly six months between major releases, with minor and patch releases more frequently. Unstable builds are available for testing before stable releases. These are not recommended for production but provide an opportunity to catch issues early.

Keep your server updated, but do not upgrade blindly. A measured upgrade strategy protects your deployment from regressions and breaking changes.

With Jellyfin architecture, capabilities, and limitations understood, we can move to the practical question of how to plan your infrastructure.

Chapter 3: Planning Your Media Infrastructure: Requirements and Architecture Patterns

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Assessing Your Media Library: Size, Formats, and Growth

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User Scenarios: Solo, Household, Multi-Household, Remote

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Concurrency and Bandwidth Requirements

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Transcoding vs Direct Play Architectures

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Reference Architectures: Simple, Recommended, Advanced, Production

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Decision Framework: Matching Architecture to Requirements

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Chapter 4: Hardware Selection: Servers, CPUs, GPUs, and the Media Workload

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The Media Server Workload: What the Hardware Actually Does

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CPU Selection: Single-Core Performance, Multi-Core Scaling, and Encoding Engines

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GPU Acceleration: Why It Matters and When It Is Essential

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Intel Quick Sync: The Default Recommendation

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NVIDIA and AMD GPU Acceleration for Jellyfin

Memory, Power, and Noise Considerations

Pre-Built vs DIY vs Repurposed Hardware

Chapter 5: Operating System Choices and Base System Configuration

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Bare Linux Distributions: Ubuntu, Debian, Arch, and Others

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Home Server Distributions: TrueNAS, Unraid, OpenMediaVault

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Virtualization Hosts: Proxmox, ESXi, Hyper-V Considerations

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Container-First Approaches and Kubernetes

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Windows as a Jellyfin Host

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Base System Hardening and Configuration

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Chapter 6: Storage Architecture: Filesystems, RAID, Performance, and Media Layouts

Media Storage Characteristics: Large Files, Sequential Access, Read-Heavy Workloads

Filesystem Choices: ext4, XFS, ZFS, Btrfs Compared

RAID Levels for Media: Performance, Redundancy, and Capacity Trade-offs

SSDs, HDDs, and Hybrid Approaches

Directory Structure and Naming Conventions for Jellyfin

Mounting Media: Direct, NFS, SMB, and iSCSI Options

Chapter 7: Networking Fundamentals: Local Networks, DNS, Ports, and Connectivity

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Network Topologies for Media Servers

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IP Addressing: IPv4 and IPv6 Planning

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DNS and Name Resolution for Local Access

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Required Ports and Services

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Firewall Configuration and Port Security

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Multicast, SSDP, and Network Discovery

Chapter 8: Installation Methods: Native, Docker, VMs, and Deployment Strategies

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Native Installation via Packages and Repositories

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Docker and Docker Compose Deployments

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Podman and Rootless Container Options

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Virtual Machine Deployments

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Installation on Home Server Platforms

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Comparing Methods: Trade-offs and Recommendations

Chapter 9: Server Configuration and Initial Setup

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First-Time Configuration and Web Dashboard Basics

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Configuring Media Libraries and Folders

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Initial Metadata Import and Scanning

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System and Playback Settings Configuration

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Logging and Debugging Setup

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Post-Installation Verification Checklist

Chapter 10: Building and Organizing Media Libraries

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Library Types: Movies, TV Shows, Home Videos, Music, Photos

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Directory Structures That Work

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File Naming Conventions and Metadata Extraction

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Collections and Playlists

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Excluding Unwanted Content

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Library Maintenance and Rescanning Strategies

Chapter 11: Metadata Management: Providers, Artwork, and Quality

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Metadata Providers: The Movie Database, The Open Movie Database, and Others

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How Metadata Scraping Works

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Artwork Sources and Quality Control

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Manual Metadata Overrides and NFO Files

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Metadata Caching and Performance

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Troubleshooting Common Metadata Problems

Chapter 12: Users, Authentication, and Access Control

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User Types, Roles, and Permissions

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Authentication Methods: Passwords, Two-Factor Authentication

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Parental Controls and Content Rating Restrictions

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Network Isolation and Trusted Networks

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Large Multi-User Environment Considerations

Chapter 13: Video and Audio: Formats, Codecs, Containers, and Compatibility

Video Codecs: H.264, H.265/HEVC, AV1, VP9, and Compatibility

Audio Codecs: AAC, AC-3, E-AC-3, TrueHD, Atmos, DTS, and Passthrough

Container Formats: MKV, MP4, AVI, and Their Use Cases

High Dynamic Range: HDR10, HDR10+, Dolby Vision, and Tone Mapping

Resolution, Bitrate, and Bit-Depth Considerations

Format Selection: Recommendations for Acquiring and Converting Media

Chapter 14: Transcoding Architecture: Direct Play, Direct Stream, and Conversion

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Direct Play: Requirements, Benefits, and Limitations

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Direct Stream: When and Why It Happens

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Transcoding: Video and Audio Conversion Pipelines

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Transcoding Profiles and Client Capabilities

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Subtitle Rendering and Burn-In

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Debugging Playback Issues and Transcoding Failures

Chapter 15: Hardware Acceleration: Intel Quick Sync, NVIDIA, AMD, and Beyond

Why Hardware Acceleration Matters for Transcoding

Intel Quick Sync Video: Configuration and Version-Specific Notes

NVIDIA GPU Acceleration with NVENC/NVDEC

AMD GPU Acceleration with AMF/Video Codec

ARM and Other GPU Options

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Verifying and Testing Hardware Acceleration

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Troubleshooting Hardware Acceleration Issues

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Chapter 16: Client Ecosystem: Desktop, Mobile, Web, TV, and Remote Access

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Official Jellyfin Clients: Platforms and Features

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Web Client and Browser Compatibility

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Smart TV Clients: Samsung, Android TV, Roku

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Third-Party Clients and Integrations

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Mobile Clients and Offline Playback

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Client Capability Differences and Implications

Chapter 17: Remote Access and Secure Exposure: VPNs, Reverse Proxies, and HTTPS

Network Access Architectures: Direct, NAT, Port Forwarding

Dynamic DNS for Home Networks

VPN Solutions: WireGuard, OpenVPN, Tailscale, ZeroTier

Reverse Proxies: Nginx, Traefik, Caddy Configurations

HTTPS and TLS Certificate Management

Comparing Remote Access Approaches: Security and Complexity

Chapter 18: Security Hardening: Authentication, TLS, and Defense in Depth

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Threat Model for a Home Media Server

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TLS Configuration and Cipher Suites

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Authentication Hardening and Session Management

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Firewall Rules and Network Segmentation

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Container Security and Privilege Escalation Risks

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Exposure, Enumeration, and Attack Surface Reduction

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Configuration File Locations and Structure

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Environment Variables and Their Effects

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Database Architecture: SQLite and Alternatives

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Scheduled Tasks and Background Operations

Chapter 20: Monitoring, Diagnostics, and Logging

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Built-In Monitoring and Statistics

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System-Level Monitoring: Resources, Disks, Network

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Logging Strategy and Log Analysis

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Diagnostic Tools and Commands

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Alerting and Notification Strategies

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Identifying and Resolving Common Issues

Chapter 21: Performance Optimization: Transcoding, I/O, Network, and Bottlenecks

Transcoding Performance: CPU vs GPU Utilization

Memory and Swap Configuration

Disk I/O Optimization and Caching Strategies

Network Throughput and Congestion Management

Database Performance Tuning

Systematic Bottleneck Identification

Chapter 22: Automation, APIs, and Integrations

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The Jellyfin REST API

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Scripting Common Tasks: Libraries, Users, Transcoding

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Integration with Download Managers and Media Management Tools

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Home Automation and Smart Home Integrations

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Advanced Automation Patterns

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What Needs Backing Up: Configuration, Database, User Data

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Backup Strategies and Schedules

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Restoring from Backup

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Disaster Recovery Procedures

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Routine Maintenance Tasks

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Long-Term Operational Checklist

Chapter 24: Migrations, Upgrades, and Long-Term Operations

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Version Upgrade Strategies and Risk Management

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Rollback Procedures

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Migration Scenarios: Hardware, OS, Platform Changes

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Evolution of Media Server Requirements

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Chapter 25: Conclusion: The Production-Grade Jellyfin Deployment

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Final Checklist for a Production Deployment

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