GAME
DEVELOPMENT
BEST PRACTICES

EPIC GAMES   CD PROJEKT RED   THE CHINESE ROOM   CLOUD IMPERIUM

PERFORCE

Game Development Best Practices

INTRODUCTION

Every game studio wants to give their audience an indelible and unique gaming experience. This means working through the inherent challenges of global teams, large files, and multiple content types. What follows is a best practice guide of useful insights from some of the most innovative studios in the business. This eBook will drive home what game development leaders already know: The best games ten years from now won't be empirically crafted, they will be theoretical conceptions, lifted from the minds of creative development teams. But the change management and file versioning used to build these great titles will be solidly established in the best practices of today. There are multiple tools and technologies available to help navigate change management and bring together the creative output of your teams. In game development, it's the observable experiences of industry leaders, which we highlight, that can alleviate many of your game development pain points."

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CD PROJEKT RED has leveraged the flexibility and single source view of Perforce to instill a system of processes that monitor changes, trigger tests, and automate fixes.

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These ongoing challenges can be noted in current trends, with large file sizes – both binary and source code – commanding greater data retention than ever before, 4K screens outputting greater visual clarity and acuity, and new technologies, like virtual reality (VR), creating wholly uncharted terrains to be explored.

A growing shift for many gaming studios is from traditional game console titles to VR projects. Developer interest has increased 15 percent in just the last year, according to attendee data from GDC 2016. Nearly half of developers surveyed stated an interest in adopting VR projects, with 73 percent saying they expect virtual reality to one day surpass game console development entirely. With top players like HTC Vive and Oculus Rift leading the way, plus competition from Sony and Google heating up, game studios are being challenged to adapt to the new development landscape, and they need to do it faster with a lower cost to their enterprise.

Beyond that, each design studio must resolve their unique, internal challenges. Smaller teams, often working with newer developers, fight to stay competitive in saturated markets with more established Triple-A game studios that boast greater funding and brand capital. Conversely, monolithic studios must coordinate their projects across large teams. They aim to become as agile as their smaller competitors but struggle to control workflows and trace changes within complex branch structures and separate digital content repositories.

The Helix Versioning Engine gives teams of all sizes the complete visibility and traceability of their projects. A Single Source of Truth that helps small teams become more powerful and large teams become more nimble.

The bottom line is that no one approach is ideal for every operation. But the core principles in this eBook will bolster the short and long-term efficiencies of any design house. Helix offers stability to branching practices in distributed environments, full traceability with secure asset versioning, and a scalable architecture best-suited to artists and developers. Read about how some of the world's foremost game studios are building their approach for better game development and creating more masterful games as a result.

Alleviate Branch Confusion

THE IDEA

The first roller coaster made in America opened in Coney Island in 1885 –it went six miles per hour. Today, roller coasters average 10 times that speed and are often operating multiple cars on the same track. We can push that analogy into game development, where teams of artists, developers, and build managers are all working on the same "track" but in very different "cars." The evolution of triple-A gaming is advancing at a staggering pace. Gameplay systems, and the development engines tasked with building them, are growing more and more sophisticated each day. Studios are pushing the boundaries of what's possible, creating assets that were at one time inconceivable. This rapid sprawl of ambition and expectation has given rise to a correlated need for larger development teams operating in distributed environments. What that means, for those working at the ground level, is an immensely complex development branch structure that can derail your game in an instant. It's crucial to bring stability and efficiency to your branching structure. This approach keeps teams productive, avoids glitches and bugs, and ensures all teams are on track to deliver the next game on time.

THE METHOD

Epic Games challenges their sub-teams to manage the different areas of their engine development while also fixing in real time the bugs that occur in their branched workspaces. Each branch is then run through a QA process before any of the code ever hits the mainline track. This creates a highly stable release branch for project content. Individual team branches stay more stable, too, because any changes not made by the team have already been vetted through the QA process. It's the visualization tools of Perforce Streams that keeps all this chaos connected and easily tracked. From Time-lapse View™, Revision Graph, to P4Merge, Helix is a Single Source of Truth for branch actions. As a result, content creators can stay productive in the mainline and programmers keep working efficiently in their team branches. Build managers can see it all in one place and coordinate effectively.

THE RESULTS

Reduced excessive branching structures and improved efficiency and productivity

Greater quality by limiting review and editing to specific branches/streams

Reduced workflow friction and delays because process is predefined

Implemented best practices: merging up/copying down reduced errors and complications in the release stream.

"Dealing with so many branches can be overwhelming. We use Perforce Streams to facilitate and help manage the complexity of our branching setup. Streams allows us to manage our development branches in a way that makes it easy to visualize how code flows through the system and to enforce best practices for merging code between branches."

Nick Penwarden, UE4 Development Manager, Epic Games

Traceability and Auditability

THE IDEA

Artists make art. Developers develop. And Triple-A game engines drive the whole operation. Why should DevOps workflows interfere with these happily independent operations? Many design studios have refined their DevOps process in order to fuse these often disparate teams. And the right tools and workflows can ensure a positive coupling is the result. That's because an errant bug can derail a whole project, and if build managers are scouring across various, unconnected repositories, good luck keeping your teams efficient and productive. When software builds lack traceability, your teams risk losing valuable IP, overwriting essential assets, or losing complete visibility of all your hard work. With Perforce, teams have the best of both worlds: a highly collaborative and secure platform to version all project changes with a monorepo that can seamlessly distribute smaller individual chunks, called narrow clones. This way, artists focus on smaller swaths of assets without cluttering their

machines or being held up by file updates they don't care about, and code developers can simply grab the baked assets they need without syncing all the added artist files to their local machines. All teams are working under a single, auditable pipeline, it just doesn't feel like it. Give your users the workflows they want while giving your managers a calm night's rest, knowing their IP is versioned correctly.

THE METHOD

CD PROJEKT RED has leveraged the flexibility and single source view of Perforce to instill a system of processes that monitor changes, trigger tests, and automate fixes. The studio has even begun automating bug fixes with Perforce — automatically closing issues using presupposed fixes built atop the mainline code. This productivity has extended to their growing user base, too, as they are reducing risk and releasing faster, even as their number of developers and artists draws close to 500. CD PROJEKT RED knows what to expect coming down their pipeline, they can track the changes their contributors make, and resolve bug issues before they even occur.

THE RESULTS

Automated build creation and testing

Intuitive solution that developers and artists both adopt, uniting each into one system view.

Build system integration with Perforce server to monitor changes and trigger tests, compilations, and builds.

Solving items on JIRA-generated bug analysis with automated bug fixes

"Quality version management makes a big difference. During a previous project, some of the data we processed was not in the version control system. It was outside the single source of truth of Perforce – and it was too late to change it. We experienced multiple issues as we grew because data was not versioned. Everything must be versioned with history and transparency."

Jacob Kutrzuba, Game Engine QA Lead, CD PROJEKT RED

Support & Foster Creativity

The Chinese Room

THE IDEA

It's hard to imagine, but at one point *Pong,* the venerable arcade precursor, was the pinnacle of gaming. It was a marked victory in the convergence of creativity and technology, gladly devoured by the masses. So, what has changed? Why aren't millennials eagerly batting pixelated, digital spheres back-and-forth? It's because with the exponential growth of technology comes an exponential demand for more creativity. Ideas and features become commonplace in gaming, and they will invariably stagnate. The tree of gaming innovation must be refreshed from time to time. More powerful gaming consoles and new development capabilities serve the widening scope of a Triple-A game title. Perforce Helix stands alone in supporting that growth, by being an accommodating partner to creative game designers. Artists prefer Perforce's intuitive interface to manage their creative assets rather than more technically-cumbersome applications. And the game studios that toil to make Git workflows fit will inevitably come to a crossroads, barring one of two things: 1) they are successfully scaling their enterprise and Git can no longer manage the file sizes in one repo, but rather within many disconnected Git silos, or 2) studios grow tired of reaching across systems to access their binary files, artwork, and designs. Git suffers under a breaking point that Perforce doesn't have – and it's the artists who pay the price.

THE METHOD

The Chinese Room focuses on creative lines of progression, opting to get design features up and running, collaborate on the work going forward, and come back to each development with fresh eyes. A step-by-step approach that keeps their operations agile and innovative. You need quality version management to do that. Instead of worrying about how best to manage assets in a VC that simply doesn't handle them well, let alone in the same place, Helix users can go "back in time" to identify issues, fix them, and move on. Perforce lets the team focus less on stitching together silos or managing disparate systems and more on what makes a good game great.

THE RESULTS

11 BAFTA award nominations

Standout independent studio since 2012

Broad OS compatibility (Windows, Mac, Linux)

2016 BAFTA Winner for Best Game (Everybody's Gone to the Rapture)

"It's easier to make games these days because of the technology. The real challenges are creative. You may worry your version management's product roadmap won't support your design features. We've never had that problem with Perforce. Everyone talks about iterating fast, experimenting, and trying stuff out, but it's especially important for us because we have such a big creative focus."
Stuart Yarham, Lead Programmer, The Chinese Room

Do Your Best Work At Scale

THE IDEA

How do you boldly go where no one has gone before? Does it involve creating design landscapes larger and more immersive than ever? Probably. Does it require enterprise access control and security to protect it? Very likely. Does it take teams of developers and designers working in concert? Absolutely. So, what if you must have "All of the Above" for a growing roster of personnel? Perforce brings your whole universe together. Sure, some small studios can manage their projects with home-cooked systems – though it's not easy – adding tools and workarounds they develop and track. But once your operation scales, or if your project is huge from day one, you'll need a versioning engine that supports all your ambitions at once. This means flexibility and performance with continuous delivery, distributed environments, and file management of binary assets. Perforce Helix caters to DevOps managers, developers, and artists, for projects that build and expand rapidly. Because who doesn't want to grow their out of this world idea into a universe all its own?

THE METHOD

Cloud Imperium Games uses Helix to guide their daily DevOps workflows, relying on its system speed and reliability. You see, their delivering the largest crowd-supported project in the history of mankind – the $125+ million title *Star Citizen.* This scale of monetized support mirrors the massive scope of both development and project contributors. The degree of interaction CIG demands each day would overload other server specifications, but with Helix, servers continue to feed their network at an exceptional rate and mitigate development interruptions. On top of that, CIG has the support of Helix granular access controls, helping to safeguard mission critical tasks through individual permissions and audit tracking. So, while CIG works at the speed of light, their system admins know their hard work is secure.

THE RESULTS

Iterative delivery on content for largest crowd-funded game in history

Distributed team flexibility; offices in the US and Europe

90 TB of data and 23 million files versioned successfully, within one central repo

Helix handles binary assets and preferred workflows for essential artists and creatives

"We're very open in our development effort – we host multimedia demos and are continuously delivering playable content to our crowd-fund community. If Perforce wasn't around, we'd be hard-pressed to find a unanimous versioning control solution."

Paul Vaden, Network Services Manager, Cloud Imperium Games

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CONCLUSION

Clearly, Perforce Helix is the versioning engine of choice for game developers. Reach the lofty goals of your creative visions with a system catered to artists and designers. Produce better work pipelines through end-to-end traceability and a Single Source of Truth visibility on all assets. And feel secure knowing your successes can never outgrow the Helix system to support it.

It's easy to try Helix for yourself. We love to give gaming start-ups a leg up, which is why we offer it free to small teams. Get our full-featured instance of Perforce Helix today for up to 5 users and 20 workspaces.

DOWNLOAD HERE
www.perforce.com/downloads/helix

Have more than 5 users? We've got that covered, too. Try our Helix trial free - 30 days of full access for unlimited users and workspaces.

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