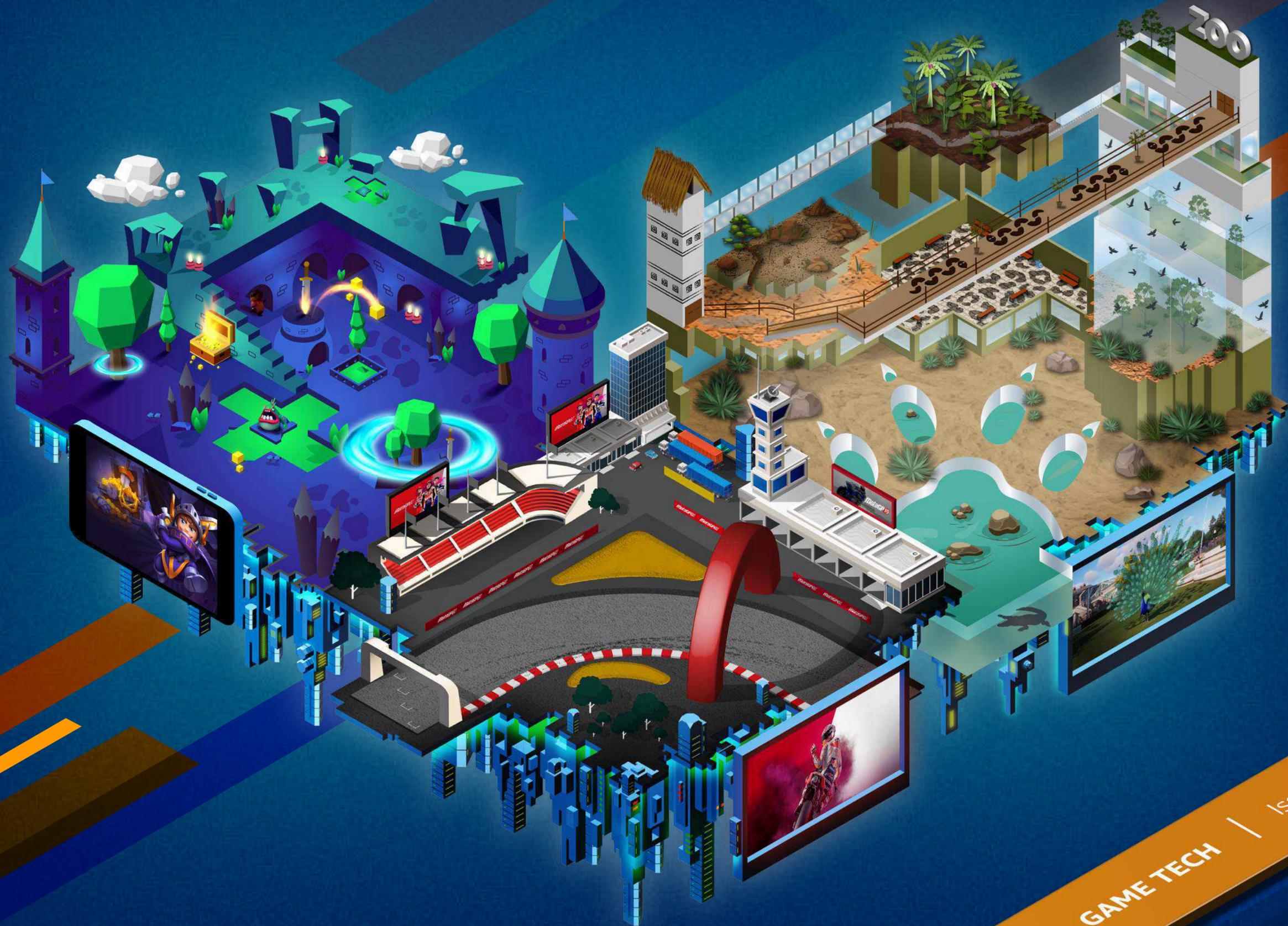


Behind every great game, there's game tech

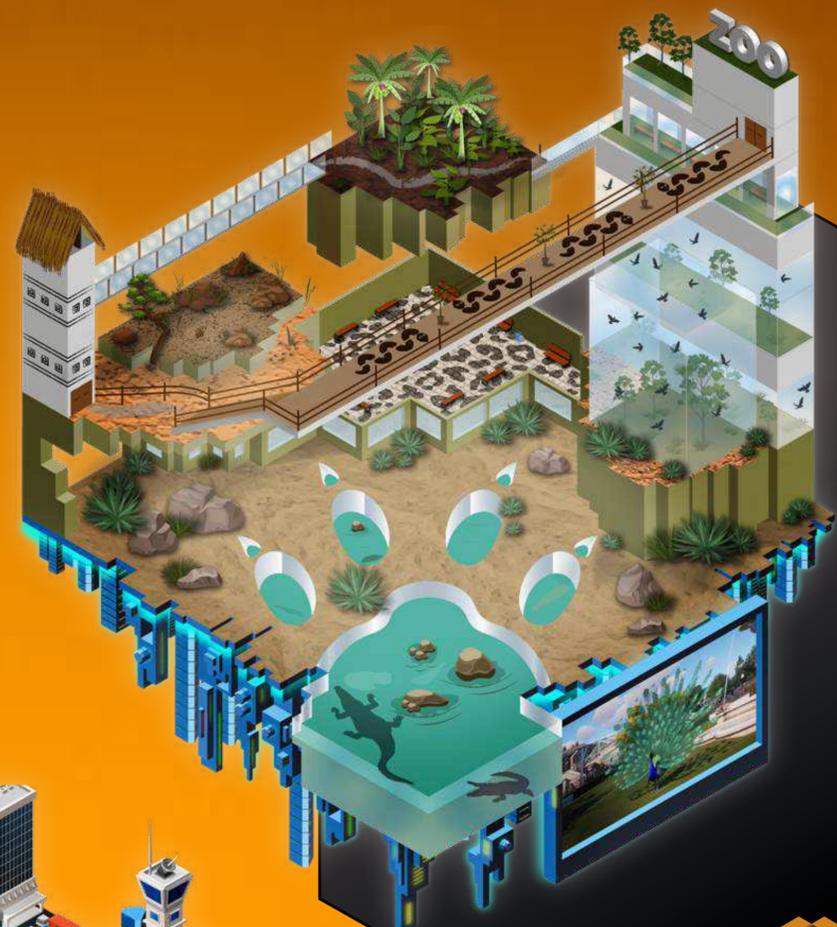
aws is how





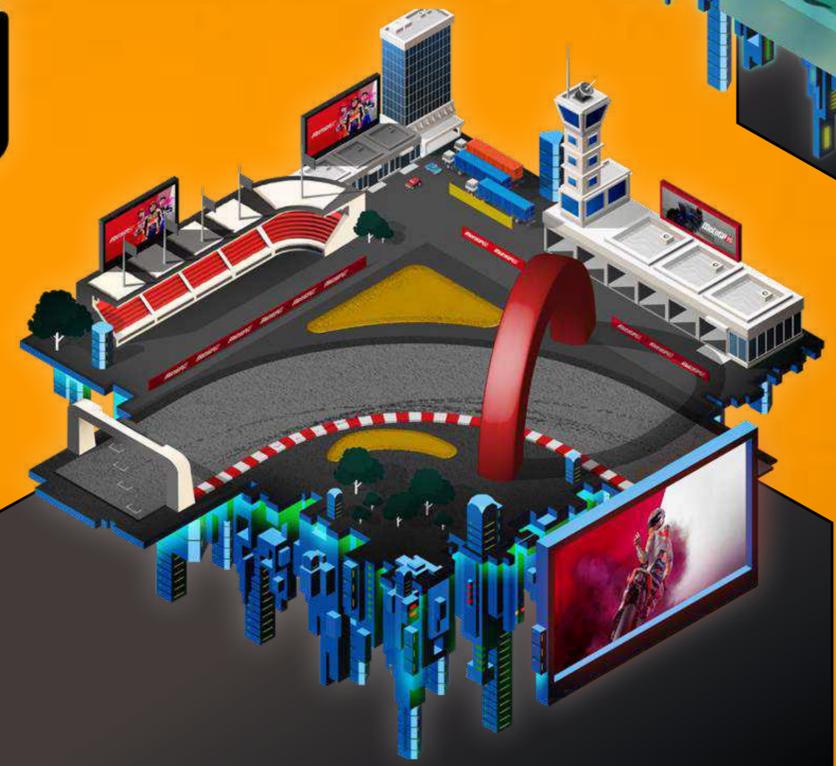
FLAREGAMES
GUARDIANS OF JOY.

NONSTOP
KNIGHT 2



FRONTIER

PLANET
ZOO



MotoGP 19





Thorsten Grösch | Gonçalo Antunes | Mikko Airaksinen

GEARED-UP FOR MOBILE ACTION

Thorsten Grösch started his career as a high-school teacher, but is now Head of DevOps and IT at Flaregames. Gonçalo Antunes is Product Lead at Flaregames subsidiary Kopla Games, while Mikko Airaksinen is the Main Backend Developer and Programmer.

Bringing the essence of action role-playing games to made-for-mobile, Nonstop Knight 2 sees players hacking and slashing their way through a series of dungeons, on a quest to win gold, armor, and weapons, as they take down hordes of formidable enemies.

Players mix and match loot with skill sets and talents such as dancing flame and frostbite, join a guild, choose an AI-driven companion, and battle their way to the top of the leaderboards in weekly tournaments.



Now part of mobile games publisher Flaregames, Kopla Games is the studio behind Nonstop Knight 2. It builds on the popularity of the first game in the series, which achieved more than two million installs within three days of release in 2015, and went on to notch-up 15 million player downloads.

It took one-and-a-half years and more than 10 prototypes to develop Nonstop Knight 2.

Gonçalo: “We wandered too far off track”

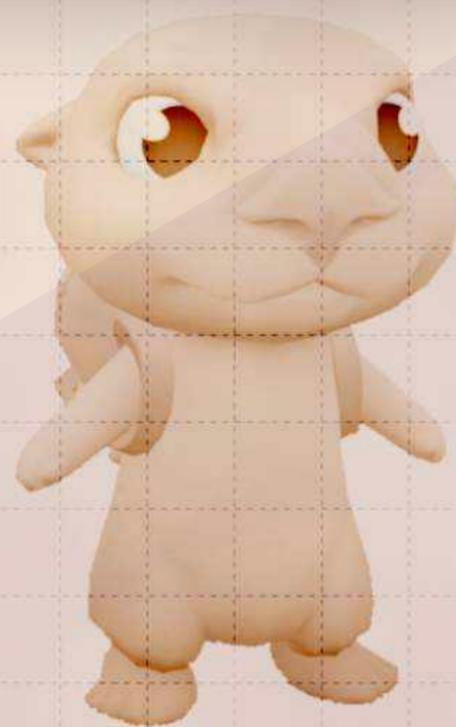
We spent a long time experimenting and killed a lot of good, varied prototypes before we came up with Nonstop Knight 2. That was partly because we decided to put role-playing games aside and experiment with other genres for a bit. While we were crossing the swamp, it made us realize we’d wandered too far off-track and away from the company’s

core mission. At that point, it was a case of: ‘Let’s go back to making approachable ARPGs, and see what we’ve learned.’

Gonçalo: “It’s all about the loot”

Nonstop Knight (NSK1) was very approachable and had a really simple, incremental meta attached to it. NSK2 was the next step, so we wanted something closer to classic action RPG. That meant it had to be all about the loot you collect on your way through the game, and players would need to be able to keep that loot, to make it more meaningful. We also wanted to make other progression factors, in terms of skills and talents, count, so we could give players a much wider choice when it came to customizing the knights. We knew we could only do that if there were sustainable progression systems, rather than something that was just wiped away regularly, as in NSK1.

Flaregames is a German-based mobile games publishing company, which works with subsidiaries Kopla Games and Keen Flare, along with other games studios around the world, to help developers bring their creations to market.



Mikko: “It’s gut-wrenching when you have to throw away your gear”

NSK1’s incremental metagame, where you lost your gear after resets, was a solution to a problem. Close to its release date, there was a struggle around how to get the metagame live. The incremental metagame worked, so the team went with that. But many of us are long-term ARPG fans, and hated the gut-wrenching feeling that comes from having to throw away all your gear.

Gonçalo: “The shackles came off”

Once we decided to leave the incremental behind, the shackles were off. We went from NSK1, where you had three sets of items, weapons, and armor that were mostly disposable, to six in NSK2. The player also has the option of unlocking special perks, by using more of one set, going half-and-half or using the joker hat which bends the rules a bit.

The challenge was to create a game in classic ARPG format, where the player has loads of choices and needs to think hard about strategy, while staying true to our mission of presenting the genre in an understandable and easier-to-manage way. The toughest part was achieving

that deconstruction, while making sure the game didn’t lose its appeal.

Mikko: “Robust base-line architecture was a boost”

Adding the three new gear slots for NSK2 didn’t provide a massive technical challenge because we reused a lot of the base-line architecture from NSK1, which has a very robust system. In NSK1 and NSK2, there are many ways perks can be activated, so adding a couple more item sources wasn’t a huge problem.

Mikko: “We knew we needed to move towards a server authoritative game”

One thing we had to re-factor and re-think was around the fact that NSK1 was a client-authoritative game. We knew we needed to move towards a server-authoritative game for NSK2, mainly because of how easy it is to cheat when it’s client authoritative. Because of technical limitations, it’s not fully there yet. Some parts are still client driven, but we’ve managed to isolate most of the sensitive ones and have developed tools to detect cheaters.

Thorsten: “Moving to the cloud means competition can be more full-on”

Enemy and boss hunts, where players go after the bad guys, are still among the most popular features in NSK2, because there’s that strong competition element. We had a problem around dungeon boss hunts in NSK1, because players can easily manipulate data in an offline game. That led to a lot of design restrictions and not being able to make it as competitive as we’d have liked. To compensate, we added layers of co-operation, but that meant you’d be competing with people in the tournament, while also co-operating with them for a common goal.

In NSK2, there’s clear separation. Co-operation happens only in the guilds, where players can gain access to exclusive items they can’t find anywhere else in the game, and competition takes place in the tournaments. That makes it thematically accurate and allows it to be full-on—you’re there to beat everyone else and there’s no layer of co-operation involved. That’s something we can do because the result, the logic, and the rules of the tournament are determined by the server and not the client itself.



Gonçalo: “We spent months honing it”

With NSK2, players can build different skill sets to customize the gameplay. That’s really popular with players, but it took a lot of time and consideration to get right. We spent months improving that feature, from prototyping right up until soft launch. We had the base skills from NSK1, so asked ourselves: “Can we themetize the skill sets? Can we make them all in one element or one class? Will they be as good, and what’s our design ceiling in terms of how many we can do?”

It took months to build the Fire skills set. We worked on the Frost skills next, and finally the Void, which was a bit easier because we’d learned lessons from the first two.

Mikko: “The companion knight kept doing weird things”

One of the most complicated aspects of the game that looks simple but caused a lot of pain, is the companion knight feature. As a player, you can recruit an AI-powered ally to take into the dungeon, so you don’t have to face the monsters alone. But although the game architecture and engine support having multiple characters on screen at the same time, it took a long time to make the companion behave helpfully, instead of doing weird things. We had to iron-out a lot of details in the AI to make it act more like a human player. There’s no point having this other ‘person’ around, if they’re not doing anything useful.

Mikko: “This feature is cursed”

Players can choose other players as companions and we wanted to make sure that wasn’t placing unnecessary stress on the system. We also didn’t want to keep the player waiting too long, so tried to pre-warm and pre-cache our data, as in preloading companion data, to make sure the UX flow was smooth. Our aim was to have the data ready in the client, so when a player clicks through to inspect, they don’t have to wait. We had a lot of issues with that, because it was really complex to make the caching work properly.

We also faced multiple situations when the server randomized a certain combination of companion knights. If somebody happened to choose three specific knights, weird and unexpected stuff would happen. This feature has been the one that’s ‘surprised’ us time and time again—it almost feels like it’s cursed. But because it’s so important to players, we’ve made the effort to keep fixing and improving it. Although it’s been a lot of work, it’s proven to be worth the effort.

Gonçalo: “Players proved us wrong”

Introducing a completely new game mode, Badlands, provided a yardstick for players and brought back a bit of NSK1 into NSK2. It’s an ‘endless’ dungeon with an ‘endless’ challenge, capped to numbers we thought the players would never reach. They proved us wrong by beating the game and the systems quite elegantly. Well, not always that elegantly—sometimes it was down to cheating, but never mind! Our aim was to bring that continuous challenge to what’s otherwise a completely linear progression system. Different modifiers gave us the ability to tweak the way bosses behaved. Visually, it’s also very different, thanks to a few little tricks from the vortex in there.

Gonçalo: “The grind is real”

We made the game much harder this time around. We wanted the early part of the experience to be as approachable and rewarding as possible, but at some point, ARPG canon says progression slows down and is balanced-out with skill and determination. One of our maxims was: “The grind is real.” We wanted depth in the core gameplay itself, so players have to invest more time weighing-up decisions and strategy around the best combos, timing, and how to face different enemies. It’s complexity without complication and, of course, we made the system harder towards the endgame, because players who stick with it, want the game to get tougher, so they can get better.

Mikko: “We were pulling our hair out”

One of the biggest lessons we learned in NSK1 was around the technical management of live operations. We carried over quite a bit of knowledge from NSK1 around dungeon boss hunts and tournaments, so that bit was relatively painless, but the new part around automated scheduling for weekly tournaments, turned out to be more complex.

For NSK1, it took a lot of manual work to set up and live-operate tournaments and boss hunts, so with NSK2 we focused on making sure everything was as automated as possible.



For humans, it's a straightforward concept that a tournament needs to start every Tuesday at a particular time; it's not that simple for computers. We were pulling our hair out, trying to figure out what was wrong with an automated test related to tournament scheduling, until we finally realized daylight saving time had messed everything up. That's an example of how translating the needs of the design into something that works flawlessly can be quite complicated.

Mikko: "The number of active players suddenly tripled"

One of the biggest benefits of running the game in the cloud is the ease and speed of scaling. A recent peak saw triple the number of active players compared to

normal. Having already set up the cloud infrastructure and scalers to respond, it all went smoothly.

Mikko: "We use AWS CloudWatch for monitoring and alerts"

We use [AWS OpsWorks](#) and [Amazon EC2 Auto Scaling](#) for the general setup of how the server stack functions in NSK2 and have multiple versions, including the live and development stacks. We use [Amazon Elastic Container Registry \(ECR\)](#) for the container repository management and [AWS CloudWatch](#) for monitoring and alerts.

Thorsten: "We don't have big teams who can maintain everything manually"

We don't have big teams, so rather than install and maintain databases manually, we use [Amazon Relational Database Service \(Amazon RDS\)](#) or [Amazon Aurora](#). We use Terraform as the basic technology to code the infrastructure for designing the complete alignment, and it acts like the central hub for everything. We also use MongoDB for database services as well as [AWS Elastic Load Balancing \(ELB\)](#), with two sets of live servers and multiple development and stable servers for testing purposes.

Gonçalo: "It was like the stars aligned"

It took a lot of luck and a real passion for video games to get where I am. I started off at a firm specializing in alarm systems, then a software company and had no clue how to go about working with video games. A stroke of luck gave me the chance to work in quality assurance at Rovio, just as Angry Birds was emerging as this global phenomenon. After that, it was like the stars aligned and I found myself

at RedLynch and now Koplá, making video games and loving it.

Mikko: "Video games have always been central to my life"

Ever since I was six and got a Super Nintendo for Christmas, video games have been central to my life. While I was studying for a masters in programming and software production, I heard Rovio were looking for people and got taken on as a trainee game producer, and that's how my career got started.

Thorsten: "I spent eight years teaching high school"

Gaming was a background hobby for me for quite a while. After graduating in computer science, I spent eight years teaching high school and loved mentoring kids into computer programming careers. I went to work at a data services company and then an insurance company, where it was all mainframes—very traditional and very boring. When cloud technology came along and shook things up, I was instantly hooked. As soon as I heard Flaregames was doing a lot of cloud stuff, I thought: "That's exactly what I want to do."





STUDIO STATS & FACTS

FLAREGAMES

GUARDIANS OF JOY.



Founded:

2011



Team Size:

15



AWS Services include:

[AWS OpsWorks](#), [Amazon EC2 Auto Scaling](#), [Amazon Elastic Container Registry \(ECR\)](#) and [AWS CloudWatch](#)



Biggest hit game:

Nonstop Knight



Key awards:

Best Publisher at Mobile Games Awards 2018



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GAME STATS & FACTS

NONSTOP KNIGHT 2



Founded:

June 2019



Players Worldwide:

1m+



Genre:

ARPG



Platform:

Mobile



Fast Fact:

Players can join guilds, embark on guild quests for bonus rewards, and even have the AI-controlled knights of their guildmates join them when battling through dungeons.



TEAM STATS & FACTS



CEO Flaregames:

Todd English



CEO Kopla:

Mika Kuusisto



Creative Director:

Janne Louhivaara



Product Lead:

Gonçalo Antunes



Producer:

Simon Mittrücker



Lead Programmer:

Vilppu Tuominen



Lead Server Programmer:

Mikko Airaksinen



Lead DevOps Engineer:

Matthew Johnson



Lead artist:

Ilkka Siik



Programmers:

Pasi Perkiö, Tomi Niemenmaa



Games Designer:

Juha-Matti Pulkkinen





MotoGP19



Michele Caletti | Game Producer

ALL THAT'S MISSING IS
THE WIND IN YOUR HAIR

Launched in 1996, Milestone is an Italian games studio headquartered in Milan, Italy. MotoGP is the official companion game to the MotoGP Championship, and for more than 15 years, Michele Caletti has played an integral role in the Milestone team, working his way up from audio developer to game producer.

There are few sports more dynamic than MotoGP. Fans demand an immersive gaming experience that delivers all the thrills and exhilaration of the real thing. To deliver that hyper-realistic gaming experience takes absolute attention to detail—from the tracks and teams, down to each bike's individual performance. And with a new game released every year, the pressure is on to make every version the best yet.

Milestone has achieved this seemingly impossible victory for over ten years with MotoGP, and the game continues to impress race fans and gaming critics alike. Along with MotoGP, the studio has gained recognition for its World Rally Championship and MXGP games, as well as its Ride and Gravel titles. Milestone was acquired by THQ Nordic in August 2019 for \$49 million.



“We feel like a MotoGP team”

When Milestone acquired the license for MotoGP more than ten years ago, it felt revolutionary because previously the game had only been made by big publishers. People expect a lot from a MotoGP game, and we know we have to live up to that responsibility by delivering an exceptional experience every year. In many ways, we feel like a MotoGP team—we can't rest on last year's success or rely on our legacy; we have to do better, go further and achieve more. Every year, Yamaha and Ducati put their best bikes and riders forward, and we do the same—put the best version of the game forward that we can.



“Our vision for MotoGP has not dimmed over the years”

From the beginning, we wanted to create a realistic representation of the sport that's as flashy, dynamic, energetic, and bold as the real MotoGP. Over the last ten years, gameplay and player expectations have evolved, and so our priorities have also changed. But we're always focused on staying true to our original vision. In recent years, we've had the budget and the opportunity to make some of our most exciting ideas come to life—things like online racing and AI-driven gaming. What was once just ambition, is now achievable.

“The first phase of a new game is purely conceptual”

We have to find new ways of presenting MotoGP every year, so we can keep players engaged. The first step in the process is purely conceptual—we have a brainstorming session where we include everything we'd like to see in the game, no matter how emergent the technology, or how challenging the idea. Only after that do we start looking at which of those ideas are actually achievable. Some raw ideas such as a career mode or an alternative form of progression through the game, start out simple, but the moment we go deeper, they introduce complications. We always have to ask: “Is this true to the real sport of MotoGP?”, or: “What would this change mean to the real rider?” Often the answers to these questions mean we have to stop an idea in its virtual tracks.





“The player experience is incredibly important”

It can be hard to know when an idea has potential or when it's time to walk away. We're not making a platform game or an RPG, where whatever you want to do is possible as long as you obey the rules of game design. When we make MotoGP, every idea has to be checked against the real sport. So to keep the game's development as close to the sport as possible, we take our teams to the tracks to experience races. We look for details and stories to tell that you might never see if you just watch the race on TV. We make a huge effort to convey the reality of the sport to players, making the game as immersive as possible.

“Our super core audience wants absolute perfection”

Our super core audience plays races that can last up to 40 minutes with no interruptions, against other hardcore players, at maximum difficulty. They expect absolute perfection, and will notice if something isn't quite right. Our other audiences, who I would definitely not call casual, enjoy the sport and the game, but aren't quite as picky! There are so many complexities to consider. We cover different classes, including Moto3 and E Class (electric bikes), and players can even choose to race on historical bikes. Every tiny detail has to be accurate.

“It's always a frantic battle against time”

Every new regulation, model, team representation, and bike variation must be included in the game. Players will notice if there are inaccuracies, and since prototypes, bikes, and sponsors can change overnight, these changes all have to be reflected before the new MotoGP game hits shelves in June. It's always a frantic battle against time.

No other racing game has as many vehicles and characters as MotoGP 19; it's even more complex than Formula One. We even stay true to the real-life technical problems of each bike and how it performs on the track. It's a huge challenge, and the more bikes you have, the more the CPU, AI, and GPU are impacted, and so the more you have to draw.

“We set a very high bar for graphics quality”

The most obvious challenge we faced with developing the game, was graphics quality. We had to analyze the different aspects, such as sky, vegetation, and light reaction, to ensure each shot in the game is as close as possible to reality. Sometimes we've had to accept tradeoffs in performance, like shadow quality or post-render effects, but the end result is vibrant and realistic, so it's worth making those compromises. We set ourselves a very high graphics target early on and we've stuck to that.

We've also had to overcome challenges around game physics and cut scenes—the point isn't to simply do these things, but to do them perfectly through several iterations, creativity and lots of hard work!

“Unreal Engine 4 puts us on the shoulders of giants”

We used our own in-house engine until 2017, which allowed us to use R&D to focus on specific functionalities, tools, or optimization options. However, it also meant we had to create, maintain, and port the engine to new platforms. An in-house engine is a lot of work and this was the main reason we switched to Unreal Engine 4. It's an incredibly powerful engine that allows us to have quality visuals and an effective and simple pipeline. It's rich with tools and features made by hundreds of skilled engineers. We're on the shoulders of giants. For MotoGP 19, we've used trueSKY—an Unreal Unreal Engine plugin for rendering realistic skies, and FMOD—a sound engine that integrates with REV for engine audio rendering with granular synthesis.

“We moved to AWS to offer a better online game experience”

We've made significant improvements to our online game. Players really wanted a better experience and we knew there were weaknesses with our old online gaming platform. We wanted to offer a smoother gaming experience, without hiccups, random player appearances or delays. AWS was clearly the best platform to work with. We had specific goals at the game level—low perceived lag, stable connectivity, host migration, to name a few—that required the switch from peer-to-peer to a server-based architecture.

“AWS helps us guarantee a consistent experience”

Before we made the move, the race quality relied on each player's own internet connection. In peer-to-peer playing, that meant everyone was pulled down to the level of the poorest connection. With sessions now being hosted on a robust server, we can guarantee a consistent gameplay experience. Everyone is competing on the same page, with the same high-quality connection and racing experience.

For some titles, you can use tricks and techniques to predict where the bullets are going, for example, but with motorbikes it's harder as people want their movements to be realistic. You can't trick them. You need a low ping and stable bandwidth, and with the AWS servers, we can guarantee that. Our players now have smooth match join (no more NAT resolution issues!), host migration, extended matchmaking options, and low lag. The result is online play that feels robust and engaging.

“Racing games need fewer services, but the ones you use need to work perfectly”

We use [Amazon Elastic Compute Cloud \(EC2\)](#) for hosting and [Amazon GameLift](#). The actual setup is pretty straightforward. Racing games tend to need fewer services, but those services need to work perfectly to create a smooth experience. Although we haven't taken advantage of all AWS' potential just yet, we've already benefited from the scalability and overall stability of the service.

“We realized there were other areas that needed fixing”

We had no challenges moving across to AWS, but it did highlight our areas of weakness. Once our online platform was running smoothly, it shone a spotlight on the areas of performance that needed to be fixed. We had to address issues such as unnecessary waiting times in lobbies and the intrusive voice chat.

“Day one can be a defining experience for an online game”

We hadn't built something as complex as this platform before, so we didn't know quite what to expect. Things like choosing the server locations or the right number of servers or their capacity worried us. There are plenty of examples where games have experienced problems on day one because they misjudged the audience. The flexibility that AWS provides to scale up and down, to relocate, and the insights it gives us, has meant we don't have to wait for the meltdown to happen. We can see which way the tide is turning and then react. We've been pleasantly surprised by just how well it's worked. We had a zero-crash, zero-issue day one, day two, and counting.





The annual MotoGP eSport Championship Global Series sees the fastest gamers from around the world go head-to-head. Last year's championship includes players from Spain, Italy, Belgium, Indonesia, Brazil, and Australia.

“The biggest development for MotoGP 19 is eSports”

We've also changed our online framework, and built a more engaging and reliable eSports experience. Our annual eSports championship has a global reach of 143 million people with 46 million views over the past two years. For last year's championship, we collaborated with Dorna—the rights holder for MotoGP—to create an immersive and unique eSports championship that made the experience even more realistic for competitors. Developers often just use stock games at their eSports events, but ours is a specialized version of our MotoGP game, aimed at professional players.

We changed the format of the championships as well. We launched our eSports tournaments over a series of events at three separate venues last year. Competitors were whittled down over the races to find the final winner, who took home a rapid BMW M135i xDrive. There was also a runner-up prize of a Yamaha YZF-R3.

“We want every player to feel like they're right there on the track”

Players should feel as if they're right there on the track with other MotoGP riders. If they don't, then we've failed. We could build an exceptional online experience using AI and other awesome tech where everything works perfectly, but if we don't create that raw feeling of riding a bike, then the game is a failure. I enjoy this challenge the most. It's like black magic. I want players to get satisfaction from every corner and braking point.

“We try to find a connection between our vision and the community's ideas”

When people asked Henry Ford for a faster horse, he gave them a car. The same applies to the development of MotoGP. We have a strong connection to the gaming community. Our audience is not afraid to communicate and tell us exactly what they think the game should be. We try to find a connection between our vision and the community's ideas. Quite often, we're aligned, but sometimes we have different views about how we should bring something new to the table. We try to find a way of listening and translating what people want into realistic game features, otherwise we could end up having a game made by popular demand, rather than one that's true to the spirit of MotoGP.



“AI creates an intuitive experience for the player”

This year, we’ve focused on enhancing our AI—ANNA, which stands for Artificial Neural Network Agent—to create this incredibly fast and intuitive experience for the player. Getting the AI right proved a challenge because it was relatively new to us and we had no references in the gaming world to refer to. We had to invent it all. It’s risky to change so many things at the same time, but we knew that what we were doing would make the game better. Even so, it’s been a huge relief to get so much positive feedback and see that players understand our vision.

“The market has shrunk considerably”

The racing game genre has contracted over the years, and the market is a lot smaller today. We’re holding our position because we’re talking to an audience that wants the very precise type of game we deliver. A game that’s realistic and rooted in real championships. The life of a MotoGP game is bound to the championship—you buy the game, you race the races as they happen, and you enjoy checking the game against reality. The game has a strong connection with the racing world and it takes energy from it.

“Marketing introduces its own challenges”

When you’re launching a game to market, it’s hard to explain everything that’s been included. You can do interviews and write blog posts, but invariably you’ll forget something important.

Another challenge is the timing. There’s a moment around February or March when people start wanting details about the new game. We try to communicate with our community through gameplay videos throughout the development, but we often don’t have physical pictures of the bikes and the outfits as we haven’t made them yet!

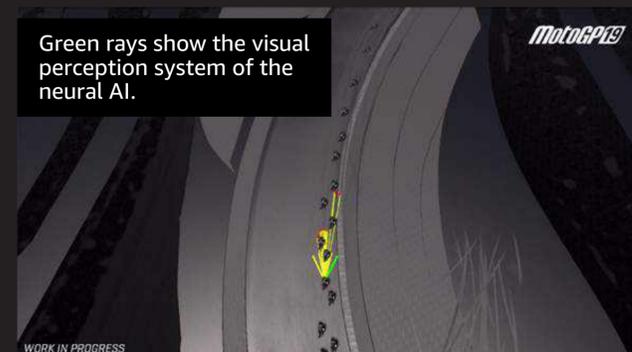
“There’s always a solution”

The one thing I’ve learned over the last 15 years, that I wish I’d known when I was younger, is to keep calm and never get angry. There will always be problems, but there is always a way to cope with them and find solutions. Many people worry too much when they’re young, but the lesson you learn through the years is that worrying is the last thing you should do. Instead, keep things transparent, keep talking, and treat people well—that way you’ll always find a solution.

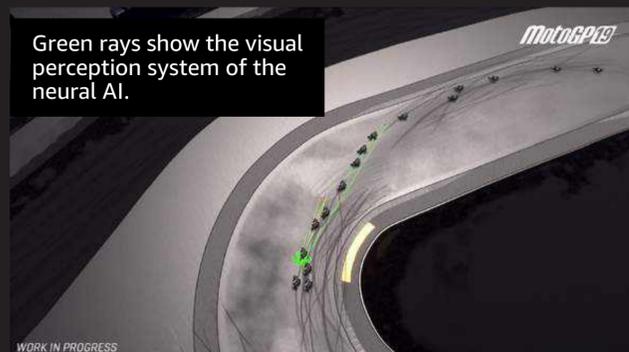


WHAT IS NEURAL AI?

Neural AI creates an incredibly fast and smart experience for the player.



Green rays show the visual perception system of the neural AI.



Green rays show the visual perception system of the neural AI.



To improve AI behaviors in the group, developers simulated random starting grids across the track.



To improve AI behaviors in the group, developers simulated random starting grids across the track.

Graphics are from internal tools, not in game



STUDIO STATS & FACTS



	Founded: 1996 (1994 as Graffiti)
	Team Size: 200
	AWS Services include: Amazon Elastic Compute Cloud (EC2) Amazon GameLift
	Biggest hit game: Monster Energy Supercross - The Official Videgame
	Key awards: Italian Video Game Awards
	Follow: @MilestoneItaly

GAME STATS & FACTS

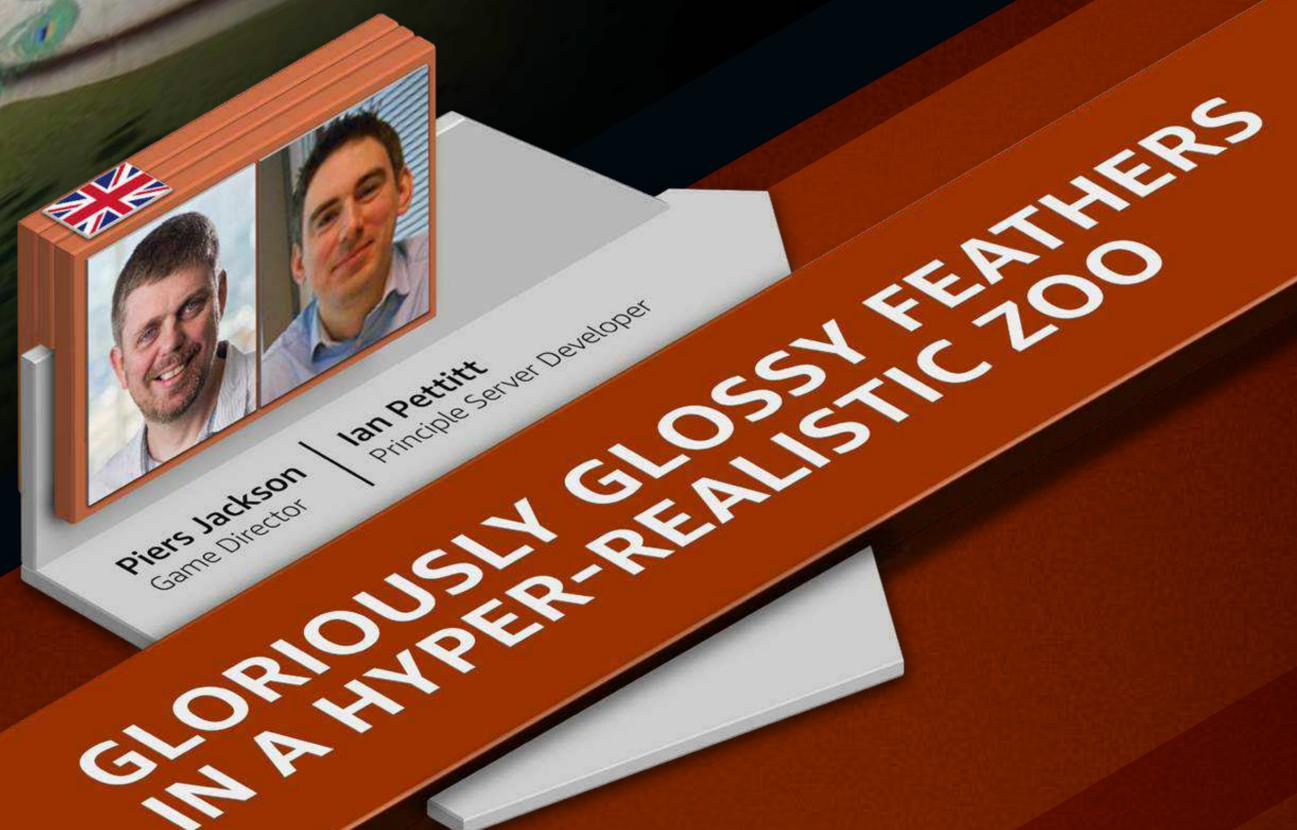
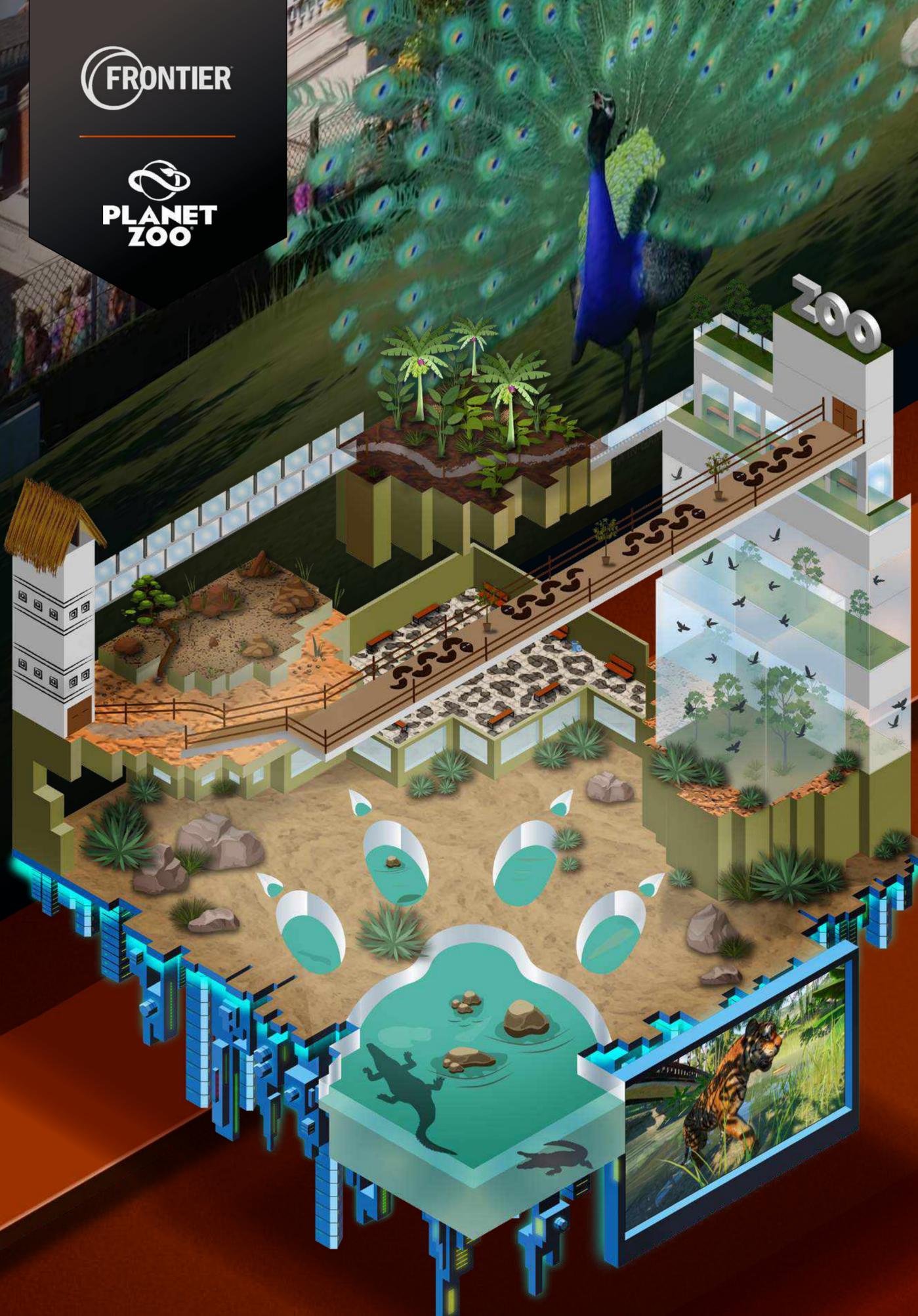


	Genre: Motoracing
	Platforms: PS4/3, Xbox, Microsoft Windows, Nintendo Switch
	Units sold: 270,000 in 6 months
	Launch date: June 6th 2019
	Metacritic score: 75
	Fast fact: The annual eSports championship has a global reach of 143 million people.

TEAM STATS & FACTS



	Executive Producer: Irvin Zonca
	Producer: Michele Caletti
	Lead programmer: Giuseppe Spizzico
	Lead designer: Matteo Pezzotti
	Lead artist: Carmine Napolitano
	Lead composer: Ian Livingstone



GLORIOUSLY GLOSSY FEATHERS IN A HYPER-REALISTIC ZOO

Piers Jackson is the Game Director at Frontier Developments. He's also a trained biochemist. Together with Principle Server Developer, Ian Pettitt, who has 15 years' experience as a full stack developer, Piers has helped to create a sim management game that allows users to fully immerse themselves in the world of zoo ownership.

Management sims form a big part of Frontier's DNA. Through the BAFTA-nominated Elite Dangerous and Planet Coaster games, Frontier has built a reputation for incredible attention to detail, ambitious gameplay, and immersive sandbox environments. Its newest title, Planet Zoo, is no exception.

With Planet Zoo, Frontier has taken its sim management expertise to the next level in a game that's highly technical and incredibly detailed. Its rich realism and technical capabilities provide online players with near real-time insights and a fully-developed online trading economy. Simply put, Frontier has created an authentic simulation world that leaves every other zoo sim coughing in its 3D dust.



Piers: “We needed to make this game”

We’ve always been involved in management sims, especially the scientific ones—these are part of our company’s DNA and we cherish them. We wanted to expand on the Planet franchise by building a world-class management sim that let us test our limits. When you combine this passion for sims and gaming, alongside the fact that it’s been a really long time since a good zoo sim game was released, you can see why we needed to make Planet Zoo.

Technology has come such a long way since we developed the Zoo Tycoon games, so we wanted to create something that would really push the boundaries—a game where people could build anything from a small zoo to something utterly amazing.

Piers: “The animals are the stars”

We created three core developmental pillars for the game. The first pillar is the animals. They are the stars, so everything has to revolve around them. Every aspect is detailed, realistic, and based on extensive research, from what each animal looks like, to exactly what they need in order to thrive. We wanted a big animal list, which was a challenge as it meant our team had to make an awful lot of characters. They couldn’t just make one elephant, they had to make male and female elephants, plus juveniles, and every age in between. I don’t think we’ve ever done anything as animation-heavy as Planet Zoo. It was a massive undertaking, and we had to develop tools throughout the course of the game’s development to give the animators the best possible environments in which to create what you see in the game today.

Piers: “The chimpanzee doesn’t want to get wet”

In the past, sims would have been 2D. With the technology that’s available today, we’ve been able to build a 3D, fully immersive experience where the animals exhibit plausible behaviors and do things that real animals would do. If that chimp doesn’t want to get wet, it’s going to go and find shelter. That behavior would have been difficult to create in the past.

Piers: “Our management pillar adds depth”

The second pillar is the zoo staff—this is our management pillar that adds depth and makes the game more than just a sim about animals. The zoo runs because of the staff, and players have to set them up, control them and keep them happy.

The third pillar is the guests. We needed advanced AI technology that would dictate how the guests respond to the habitats the players build.

PRO GAME TIP...

Beta reviewers lost some of their animals before they realized exactly how complex it is to raise animals in a zoo. Players are rewarded for researching the food, habitat, lifestyle, and foliage that will keep each animal happy and healthy.

Piers: “We want players to care about the animals”

Once we’d agreed this was the game we were going to make, we tested our ideas, ran the sims and the numbers, and developed some of the technology. The fur technology has allowed our artists to put realistic fur on the animals—fur that responds to rain and movement. The eyes are incredibly realistic and the attention to detail still blows me away. We spent a lot of time working on the eyes, the feathers, the fur, and the skin.

When people look at the animals, we want them to say: “That is a living, breathing animal that I care about.”

Piers: “The animals can cope with whatever players throw at them”

The navigation system is perhaps our most impressive technology feature. We’ve built this 3D terrain players can manipulate into any shape or form, but the animals still have to be able to navigate it. And they can! This is cutting-edge. Animals can swim, get out of the water onto land, climb trees, and navigate all the other things players have put in play. Our navigation system can update dynamically, so the animals can cope with whatever players throw at them. It took a lot of prototyping, blood, sweat, and tears. But it’s there.





Piers: “There’s a lot of foliage on Earth”

We invested a lot of time into our foliage to ensure players could build the right biomes for their animals. There’s a lot of foliage on our planet, so it was a huge undertaking. We created viable weather systems that send down snow, and rain and wind, and sunshine—all these engage with the environments incredibly realistically. Snow settles; pools of water appear in the rain; and as the animals get wet their fur flattens and gets darker. The animals get up and move if they don’t feel like being cold or wet or hot. There are a lot of reactive graphics involved in selling the realism. We want players to believe they’re there, making a difference, living in this world.

Piers: “We engaged with people who work in zoos”

Our goal was to ensure the game emulated a real zoo in every possible way. Even though the game includes certain mechanics, such as advanced time speeds, we’ve upheld the rules of a living zoo. These rules are very specific. You need to get a zoo license, educate people about biodiversity, create habitats that are suitable for animals, ensure high animal care, avoid escapes, and manage captive animal breeding to release animals into the wild, among many other factors.

Authenticity has been key for us throughout the development of Planet Zoo. We’ve done all the research, engaged with the people who work in zoos, and tried to take onboard all the elements

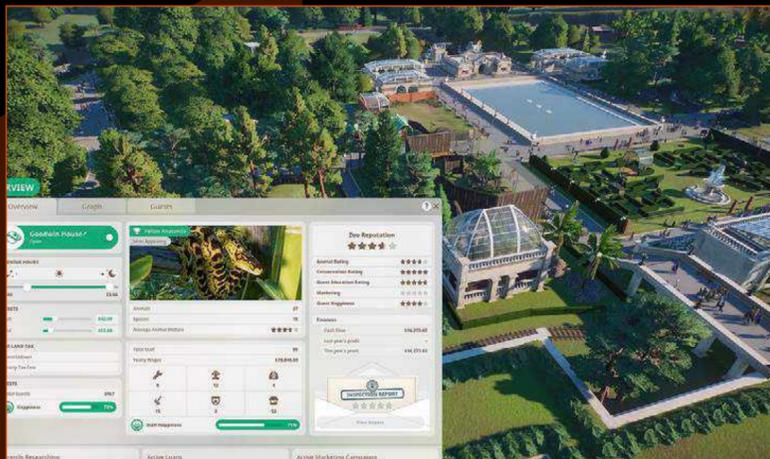


that make up the running of a zoo. We’ve even built a Zoopedia that lists every animal and its husbandry—the depth is staggering, and it varies from animal to animal. So a lot of the management of the game is based on actual requirements for these animals in captivity.

Piers: “Thanks to our community, we added in a fourth game mode”

We learned so much from our Beta. We had a lot of positive, constructive feedback that led to us adding in a fourth game mode—an offline Challenge Mode.

Now we have Career Mode—a narrative campaign that runs across multiple zoos and challenges; Classic Sandbox Mode—where creative people build whatever they want and share their ideas with the online community; Franchise Mode—online gameplay that allows players to build multiple zoos and trade with other players online; and the new Classic Sandbox Mode—where players can participate in challenges, but where everything is purely offline within a fuller economy.



Piers: “Meeting fans’ expectations has been the biggest challenge”

Players have expectations about what they’re going to see and do in Planet Zoo, and we’ve had to fulfill these as best we can. That’s been the biggest challenge. Our character artists and animal and render specialists have pulled together something remarkable. But the thing I love most about this game is seeing what people do with it. We can create the environment and the simulation, and we can have ideas about what a zoo should look like and how you should play the game, but the joy is in watching people do something completely different.

Ian: “Someone built a huge dragon skeleton”

We saw some incredible player builds in our Beta. Habitats inside glass buildings that have these complex internal terrains and hidden staff and management areas. Someone built a huge dragon skeleton and put it into a habitat for the animals to live in. There are already so many videos of people’s creations!

Ian: “We’ve developed a flexible system that can cope with different events”

In the online franchise mode, we track all the animals from birth, through all life events, and allow for players to trade these animals. It involves a lot of data

storage in [Amazon Aurora](#) to keep track of the animals, the users, the zoos, the franchises, and the state of trading.

We’ve also introduced community challenges consisting of different in-game events where we encourage all online players to participate in exchange for rewards. This means we have to provide near real-time statistics for players and the community as a whole. We use [AWS Lambda](#) and [Amazon Athena](#) to take on telemetry data from events in the game, and then we use [AWS Glue](#) to crunch the numbers for percentiles and stats that we then return, via API, to the players. [AWS Glue](#) also analyzes the performance of the community and the individual contributions and rewards of the players in the game. Because the challenges differ every week, we’ve developed a flexible system that can cope with different events and rewards. We use the technology stack to track and reward people, and [Amazon Simple Storage Service \(Amazon S3\)](#) for storage.

Ian: “We have enough capacity to cope with a sudden influx of players”

Using the AWS cloud, we can scale to ensure we have enough capacity within minutes of an influx of players; we increase capacity through [Amazon Aurora](#) and [AWS Elastic Beanstalk](#) to cope with variable player numbers. We use autoscaler in [Amazon Aurora](#) to reduce the number of instances, dependent on players and time of day, to make costs

more manageable. We’ve implemented [Amazon S3](#) and [Amazon Athena](#) to ensure we’re not overloading the system and, with [Amazon Relational Database Service \(Amazon RDS\)](#), make sure the game is responsive to players at any time of the night or day.

We picked [Amazon Aurora](#) because player numbers differ all over the world, and we have different demands at different times. We needed a system that could scale in and out so players are never disappointed. We’ve also found [Amazon Athena](#) is the right fit in terms of responsiveness and in handling the variety of different player statistics that need to be aggregated.



Piers: “It’s important to make games for other people”

We all grow and learn in this industry and perhaps my biggest lesson has been to make games for other people and not for myself. The key is to look beyond your own requirements and to put the players who will engage with the games at the center of what you’re doing. It may sound obvious, but when you’re first starting out, this may not be your first thought.

Piers: “Make a game that’s different”

The biggest challenge facing the sector right now is how to make something that stands apart from everyone else. There are a lot of ‘me too’ games out there, but the goal should always be to make a game that looks and feels different. That’s a good way to look at any challenge in any business—how do you differentiate?

STUDIO
STATS & FACTS



	Founded: 1994
	Team Size: 500
	AWS Services include: Amazon Aurora , AWS Lambda , Amazon Athena and AWS Glue
	Biggest hit game: Jurassic World Evolution, 2m+
	Key awards: Named one of UK game industry’s Best Places to Work in the Gameindustry.biz awards.
	Follow: @frontierdev

GAME
STATS & FACTS



	Genre: Simulation Management Game
	Platforms: PC
	Launch date: 5 November 2019
	Metacritic score: 81
	Fast fact: The Deluxe version of the game includes an extra three unique animals—the Pygmy Hippo, Thomson’s Gazelle and Komodo Dragon.

TEAM
STATS & FACTS



	Director: Piers Jackson
	Producer: Steve Wilkins
	Principal server developer: Ian Pettitt
	Lead programmer: Andrew Chappell
	Lead designer: James Taylor
	Artist: Marc Cox
	Composer: J.J. Ipsen

POWERED BY AWS



MotoGP19

MotoGP gamers demand hyper-realistic gaming experiences. They want an intuitive racing experience that puts them right there on the track with their idols. That means every detail has to be perfect, from the bike and rider to the clouds in the sky. Milestone not only delivers, but improves the game year-on-year. Moving to AWS has enabled the studio to make significant improvements to the online game, including smooth match join and low lag.



FRONTIER



Territorial lions, chimpanzees who don't like the rain, and visitors who wave placards if you don't treat the animals with care, are just some of the challenges you'll come up against when playing Planet Zoo. The studio had its own challenges to overcome, including the need to provide near real-time statistics for players across the globe. Frontier relies on services such as [AWS Lambda](#), [Amazon Athena](#), and [AWS Glue](#) to make sure the game exceeds player expectations.

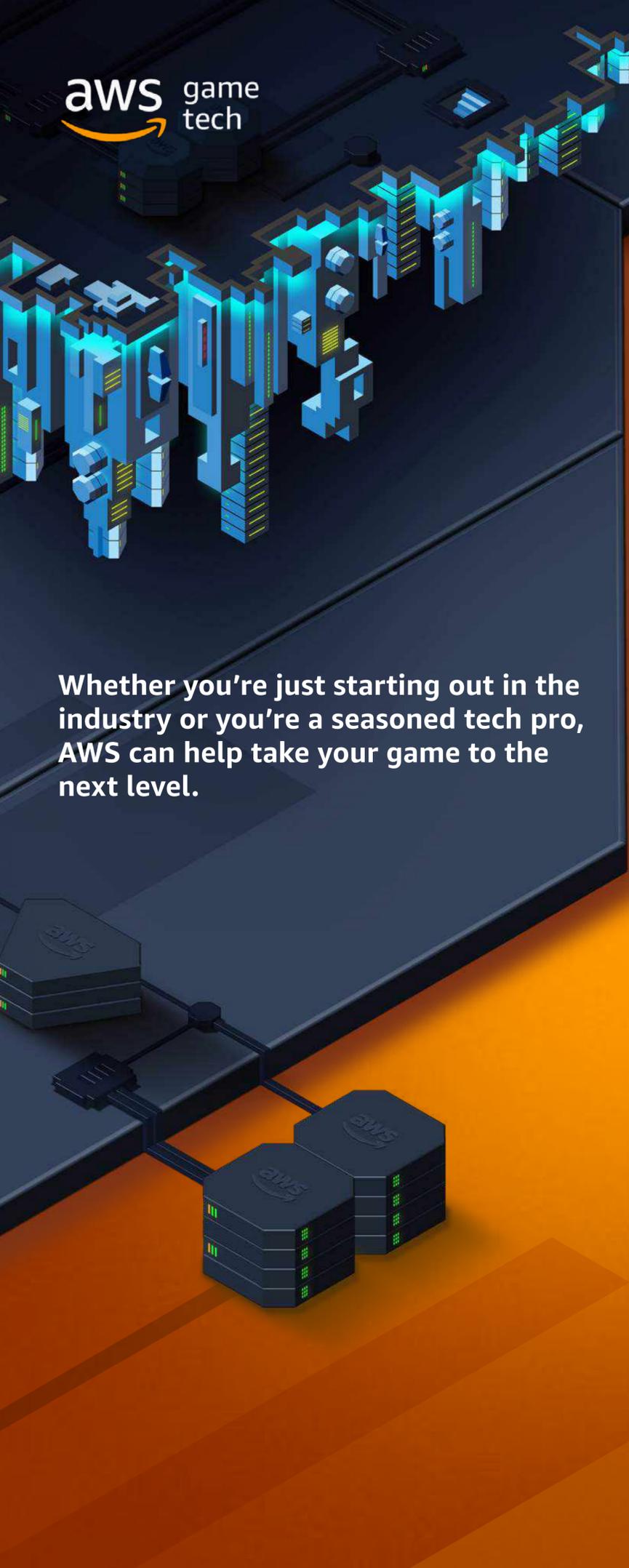


FLAREGAMES
GUARDIANS OF JOT

NONSTOP KNIGHT 2

There's a reason Nonstop Knight 2 scored more than a million downloads in six months. The role-playing game took the best parts of its predecessor and threw a whole heap more fun into the action, from customizable skill-sets to AI-powered companions and a new game mode. [Amazon RDS](#), [Amazon Aurora](#) and other cloud-based services meant Flaregames could build the hit game with a core team of just 15 people.





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