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Game Technical Document

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wolflow
GAMES

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1. Project Goal

Forbidden Seas will be a 7/24 multiplayer networked games for Microsoft Windows and Mac OS, available in Europe, North America and Asia. It will be setted in a client-server based infrastructure. Players can start the client on their machines that will connect to a centralized server system.

2. Provided Services (Beside the Game)

Customer support, forum, out-game ranks, stats and account informations, web page and social contacts.

3. Client side

The final users will download, from the official web page of the game, the client downloader. That application will allow them to download and install the client application on their machines. Through the client the players can authenticate to the server and can access to the management system of their account. From this they can also decide to play a new match according to the game modes described in the GDD at chapter 5.5 but the matchmaking system will be transparent to the client point of view, so the players will be directly transported into the lobby. When every other players inside the lobby will be ready the game begins.

3.1 Hardware Requirements

A Personal Computer with at least this requirements:

- CPU: SSE2 instruction set support
- 2GB RAM (Estimated)
- Dedicated graphic card with at least 1GB VRAM (Estimated)
- Graphics card: DX9 (shader model 3.0) or DX11 with feature level 9.3 capabilities
- Audio card
- Broadband internet connection
- Mouse and keyboard

3.2 Software Requirements

- OS: Windows 7, Mac OS X 10.10
- DX9 or OpenGL 4.0

4. Workload Estimation

Based on the TOP performers and competitors considered in the Game Design Document at chapter 3.4, it can be estimated that the infrastructure will serve approximately 100 thousands active players per months with an average of 3.5 thousands daily players. It can also be estimated that, at this time, the peak of users connected to the game will be around 10 thousands in a day.
For each user the system will save the account infos, matchs statistics, unlocked game elements, achieved trophies and overall ranks for around 200-400KB each user.
For each client connected to the game server and inside a match, the server machine will dedicate an estimated amount of RAM in the order of 10MB.

STEAMCHARTS *An ongoing analysis of Steam's concurrent players.* search games

SMITE Store | Hub

6,002 playing 2 hours ago | 14,939 24-hour peak | 23,488 all-time peak

Month	Avg. Players	Gain	% Gain	Peak Players
Last 30 Days	*8,790.9*	*-1,067.4*	*-10.83%*	*17,511*
April 2017	9,858.2	-355.9	-3.48%	20,522
March 2017	10,214.1	-774.8	-7.05%	21,664
February 2017	10,989.0	+493.2	+4.70%	22,705
January 2017	10,495.7	+873.8	+9.08%	22,342
December 2016	9,621.9	-37.6	-0.39%	19,285
November 2016	9,659.6	-636.5	-6.18%	18,291
October 2016	10,296.0	+738.3	+7.72%	19,840
September 2016	9,557.8	+396.3	+4.33%	19,071
August 2016	9,161.5	+640.8	+7.52%	16,907
July 2016	8,520.7	-640.5	-6.99%	15,348
June 2016	9,161.2	-413.1	-4.32%	18,481
May 2016	9,574.3	-1,760.2	-15.53%	19,890
April 2016	11,334.5	+325.5	+2.96%	22,526
March 2016	11,009.0	+933.0	+9.26%	23,488
February 2016	10,076.0	+58.9	+0.59%	18,977
January 2016	10,017.1	+2,280.2	+29.47%	21,473

Fig. 4.1 Smite average players per day charts for comparison

5. Frontend

In order to build the infrastructure behind Forbidden Seas, it needs to be provided a front-end to the users in order to give them the possibility to create their own accounts, manage them, view the overall ranking and personal statistics, download the game, contact the support and participate to the forum. This will be granted through different web services hosted in a dedicated and centralized server. It has been estimated that the workload for these services will not be so huge compared to the workload to host game servers but it needs also to have a dedicated machine, powerful enough to fulfil these tasks.
It has been chosen a rent server infrastructure hosted by OVH.
OVH is a french hosting company. It provide dedicated server, domain and cloud computing. It is based in Roubaix in northern France. It was created in 1998 by Octave Klaba. The company has 17 datacenters for a total of 250,000 servers. It also offers its services in 17 countries including France, Germany, Italy, Poland, Spain, Ireland, UK, Finland and Canada. The company is growing and is also exporting its services to the United States. The company implemented the IPv6 protocol. In 2009 it was ranked as the third largest server hosting on the Internet and the largest in Europe. In 2015, he became the official sponsor of the Let's Encrypt project, an open certification authority offering free SSL certificates.

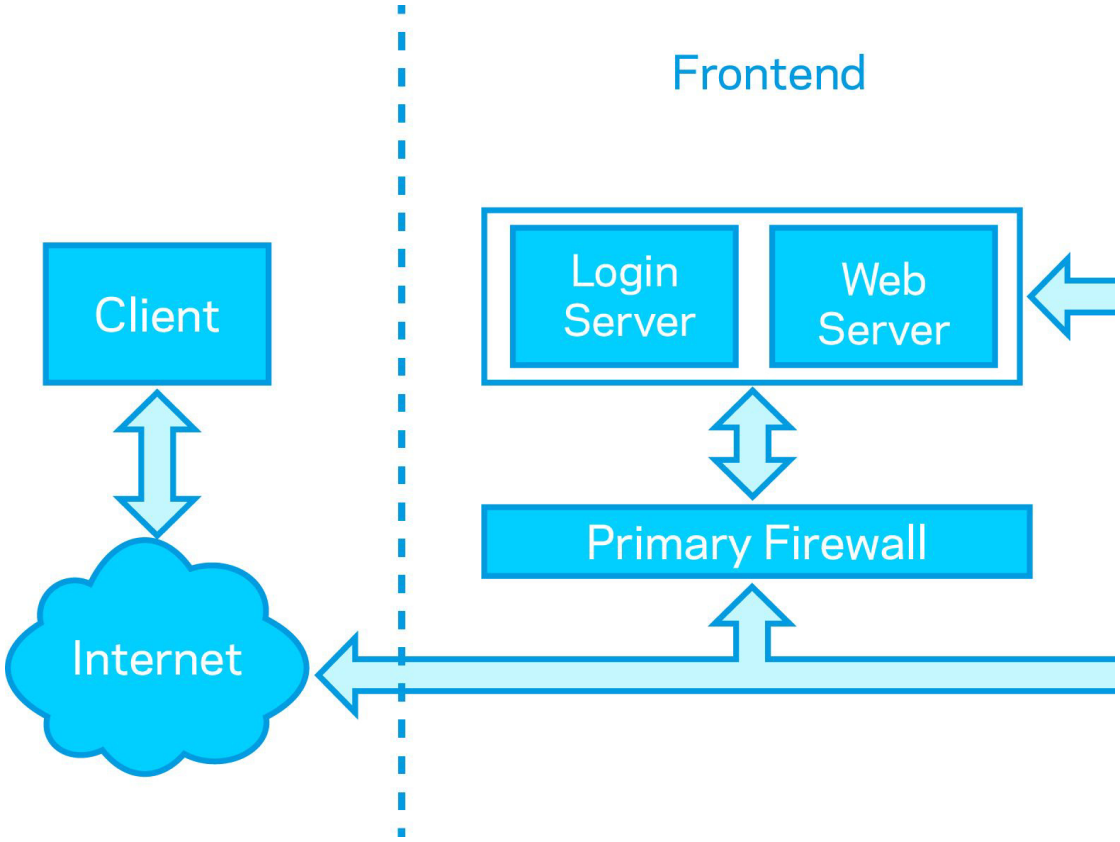


Fig. 5.1 Frontend schematic

5.1 Platform

In order to manage the web server and the login server it was thought to use Linux as the main platform for all the infrastructure.
It has been chosen Linux OS because of its stability and because it's easier to access remotely to it. There upgrade is an easy task and doesn't need to reboot or kill a process and restart it, and in case of error it's easier manage it on linux from remote. There are even a lot of tools available, like tcpdump or lsof, that other platform doesn't have or are tricky to use.

5.2 Hardware

Web Server and Login:

- 1x OVH HOST-32L Xeon D-1520 4/8t - 2.4 GHz/2.7 GHz 32GB DDR4 ECC 2133 MHz SoftRaid 2x2TB 250 Mbps banda passante vRack: 10 Mbps (Connection between internal systems)

Firewall Hardware:

- 1x OVH Cisco ASA 5505

Management:

- 1x Workstation Dell Precision Tower serie 3420
- 1x Monitor Dell 19 E1916H

5.3 Software

Linux CentOs
Apache Web Server

5.4 Scalability and Extensibility

The first option in terms of scalability that OVH offers is an increase of bandwidth from 250 Mbps to 1Gbps. Furthermore, if the game will reach a great amount of people we intend to rent from OVH more machines and more powerful in order to create a net able to handle a great amount of traffic.

6. Backend

Based on the service that it wants to be granted to the players it needs to be available a dedicated game server infrastructure and a storage system capables to register all the information about the users and capables to give real time responds to all the clients connected to it. As the frontend, also the backend take advantage of the OVH services.

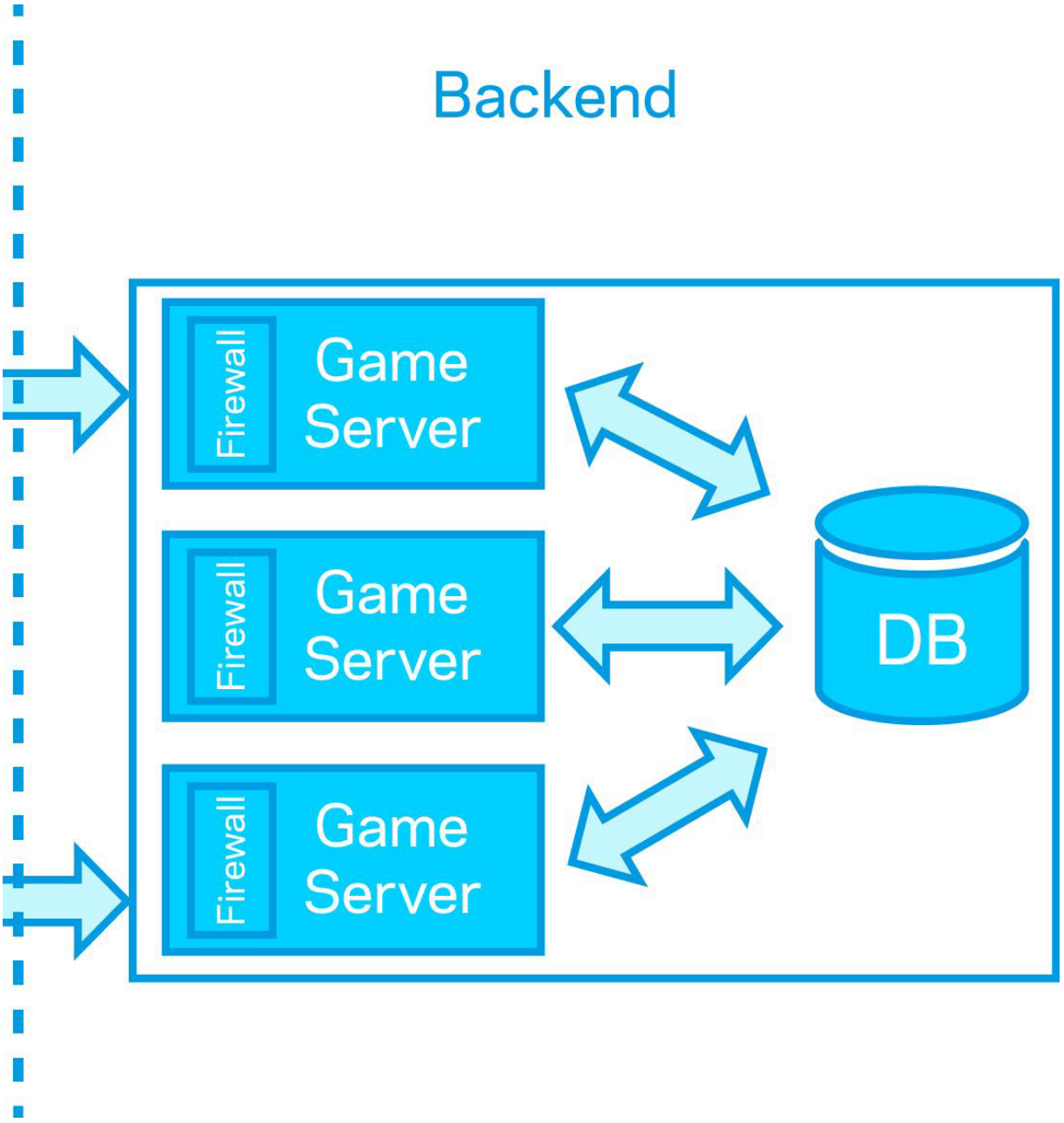


Fig. 6.1 Backend schematic

6.1 Platforms

Also for the backend it has chosen a Linux Based system in order to simplify the management of resources and for the other reasons explained before in chapter 5.1.

6.2 Hardware

Game Servers:

- 3x OVH MC-64-OC Intel i7-7700K OC - 4/8t - 4,7 GHz/5,00 GHz 64GB DDR4 2400 MHz

DataBase Servers:

- 1x OVH Storage NAS-HA da 1.2TB

Management:

- 3x Workstation Dell Precision Tower serie 3420
- 1x Workstation Dell Precision Tower serie 3420 (different customization)

6.3 Software

Game Servers OS:

- Linux CentOs

Database Servers:

- Postgresql
- Linux CentOs

Management:

- Linux Ubuntu 16.0

6.4 Scalability and Extensibility

First, if the game suffers problems of bandwidth, OVH offers the possibility to increase it from 250 Mbps to 1 Gpbs and more. Furthermore, if the problem will be the computation capacity, it need to rent, from OVH, other machines to create a network of machines. Each geographically located server will receive the incoming requests and it will transmit them to other submachines in the same geographic location that will handle them.
But if the traffic will increase a lot, we think that it’s necessary to create our network of game servers.

7. Development

The development of Forbidden Seas has an estimated workload covered by:

- 3 programmers
- 3 3D artists
- 1 Sound Designer

7.1 Platforms

To develop Forbidden Seas it will be use Unity game engine, because it provides all the features needed in order to develop what explained in the GDD of Forbidden Seas: a multiplayer online battle arena with up to 8 players simultaneously in game.

7.2 Hardware

Based on the estimated team composition it needs to have at least these machines:

Programming & Development:

- 2x Workstation Dell Precision Tower serie 5810 [Processore Intel Xeon E5-1650 v4]
- 1x iMac 27” 5K
- 2x Monitor Benq GW2406Z IPS da 23,8" Full-HD

Graphics:

- 3x Workstation Dell Precision Tower serie 5810 [NVIDIA® Quadro® M2000 da 4 GB]
- 3x Graphic tablet: Wacom Intuos PRO
- 3x Monitor Benq GW2406Z IPS da 23,8" Full-HD

Audio:

- 1x Workstation Dell Precision Tower serie 3420 [Intel Core i7-7700 + ASUS Sound Card Essence STX II]
- 1x Midi Controller: Akai Professional MPK Mini 25-Key
- 1x Headphones AKG K420 MKII
- 1x Microphone AKG P120

In Studio Testing:

- 1x Notebook HP 15-ay105nl (chosen based on the "Amazon best seller laptop" ranking in order to simulate a playing home environment)

In Studio Network:

- 2x 3Com OfficeConnect Gigabit PoE Switch
- 1x D-LINK DIR-890L (AC3200) ULTRA WIFI

7.3 Software

Programming & Development:

- Unity game engine → 2x Licenses
- Git (GitHub support)

Graphics:

- Blender
- Allegorithmic Substance Pack → 3x Licenses
- Adobe Photoshop CC → 4x Licenses

- Adobe Illustrator CC → 1x License
- Krita

Audio:
- audiokinetic Wwise → 1x License

Team Management and Scheduling:
- Git
- Asana → 7x Premium Membership
- Cloud Storage System

7.4 Major Software Development Tasks

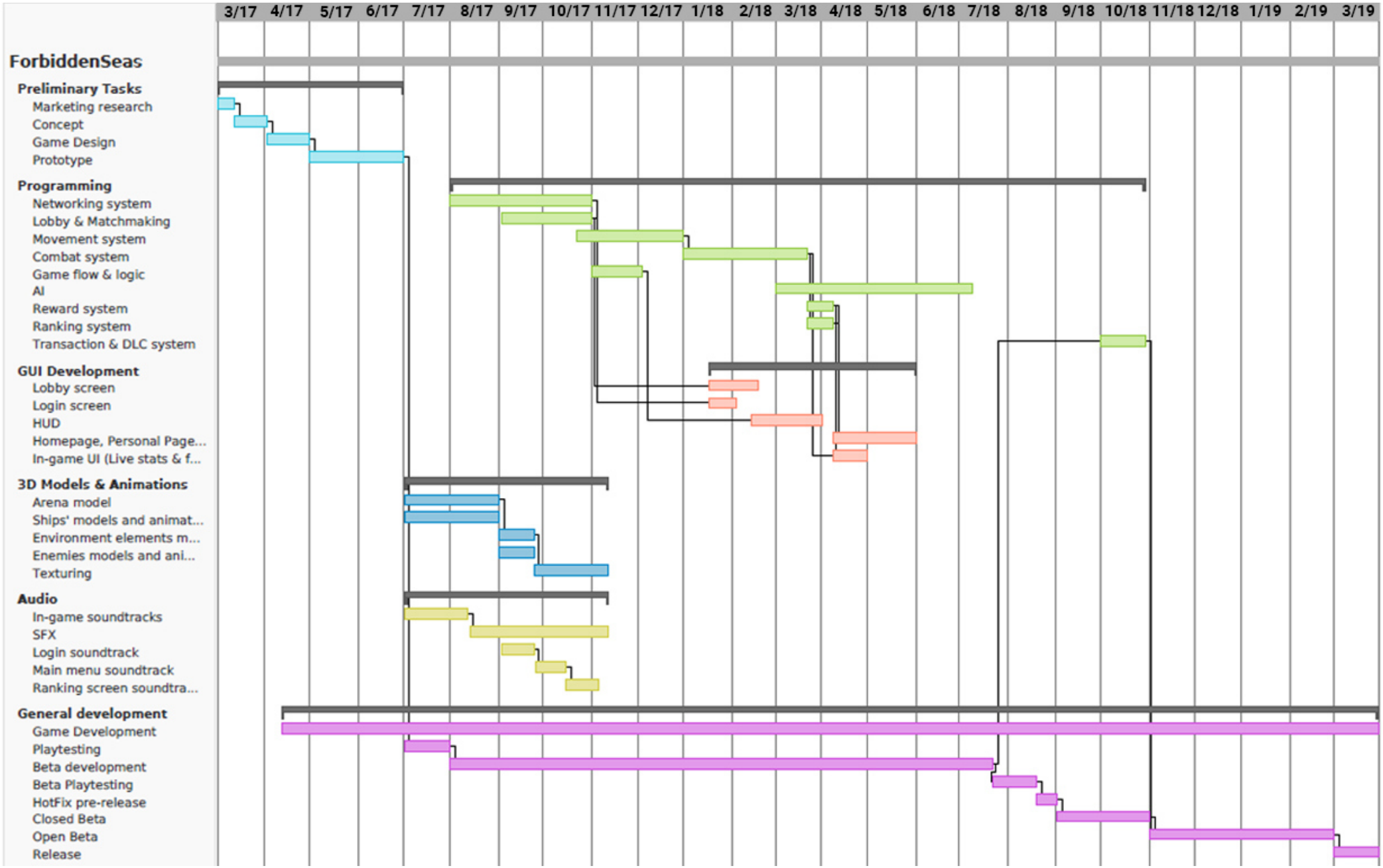
Programming:
- Networking system
- Movement system
- Combat system
- Game flow & logic
- Winning condition
- AI
- Lobby & Matchmaking
- Reward system
- Ranking system
- Transaction and DLC system
- General GUI integration

GUI Development:
- Login screen
- Main menu and account & character management screen
- Ranking screen
- Lobby
- In Game UI (Live statistics and Live visual feedback)

Models & Animations:
- Ships' models and animations
- World environment (Arena)
- Enemies and animations
- Other in game elements
- Avatar for each class and animations
- Texturing

Audio:
- Login soundtrack
- Menu and ranking soundtrack
- SFX for menus, animations and in game events
- In Game Soundtracks

7.5 Development GANTT



8. External Services

To guarantee the customer support service, we think to outsource it to other companies specialized in customer supporting like 5CA or Influx. These companies have a strong experience in this field, for example 5CA has experience in supporting game's companies like Activision and Rockstar Games. Usually these companies adopt a pay-per-response policy, so the price for this type of service will depends directly on the total number of users.

9. Communication

9.1 Global Infrastructure Outline

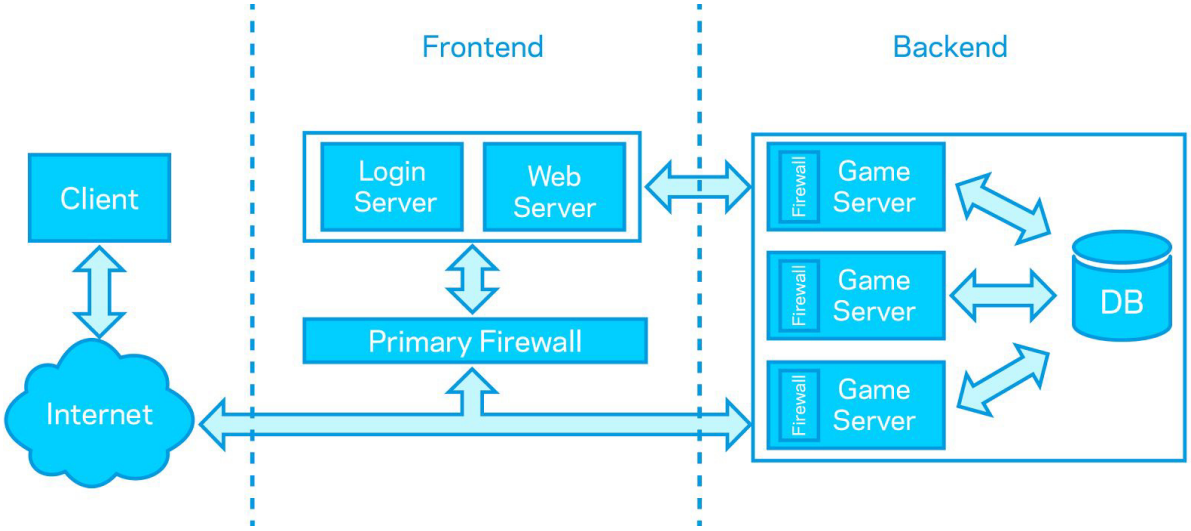


Fig. 9.1 Infrastructure schematic

9.2 Network Requirements

On server side, based on the workload estimation and on the total data amount, it needs to have a bandwidth at least of 250Mbps for each server.
On client side besides, an average broadband Internet connection will be fine. Obviously more will be better.

9.3 Network Hardware

Relying on the services offered by renting machines companies like OVH, it isn't necessary to manage the hardware physically. These companies guarantee remote access to them.

9.4 Key Protocols

The client will communicate with game server through UNET protocol (high performance transport layer based on UDP).

10. Delivery

10.1 Estimated Delivery Time

We estimate that the game will be ready to be released in two years, other game elements will be added in the future with next updates.

10.2 Delivery Platform

The download link of the client downloader will be available on the official web page, then the downloader application installs the client. In case of patch the client look for them, and in case there is one or more start the update.

10.3 Delivery Methodology

First will be released the closed Beta version limited for ten thousands users for about three months, then, after some fix if needed, will be released the open beta with free access for everyone for about six months. After this time will be released the final version of the game. In case of additional contents, fixes and game's balances, could be released patches that the client will automatically download.

11. Staff

11.1 For Infrastructure Setup (software)

- 8x System Engineer who have to be expert in Linux Systems and have confidence with Postgres DBMS and apache web servers, helped and coordinated by the programmers from the development team in order to achieve their requirements.

11.2 For Infrastructure Management

The same people who setup the systems will be in charge to manage them. Because OVH covers the customer service for the hardware, the system engineers will have to manage only the software and to dedicate themselves to maintain it without external customer support. Obviously, in case of serious problem to the system it will be found and provided an external help to the team.

11.3 In game

- 6x Game Masters, divided in three small group of two people, one for each server.

11.4 Other

In order to provide other services like: customer support from 10:00AM to 19:00PM (time zone dependent on the server location), forum and social contact. It needs to have also these professionals:

Customer Support
As mentioned in chapter 9, this service will be outsourced in order to be guarantee worldwide.

Forum and Social Contacts

In order to provide this service it has been chose that this service will be splitted in two different entities and each one will handle the workload for the world zone associated to it. This choice is motivated by cultural and practical reasons.
This service will be splitted in occidental and oriental. For the occidental one the official language used by the staff will be the English. Instead for the oriental the official language used by the staff will be the Chinese Mandarin. So the contents and messages distributed through this communication channels will be in these languages.

Occidental forum and social contacts (like Facebook page, Twitch, YouTube, Twitter)

- 1x Community Manager
- 1x Copywriter / Creative

Oriental forum and social contacts (like Tencent’s apps, Facebook page, Twitch, Youtube, Twitter)

- 1x Community Manager
- 1x Copywriter / Creative

12. Payment System

The business model used by "Forbidden Seas" involves the introduction of in-game payments and purchases for additional contents to enrich the game experience, like is explained in Game Design Document at chapter 3.6. So our business model is based on microtransactions.
In order to implement this type of transactions, in the early stage of life of the game, will be provided only a PayPal based payment. But later the game will be extended to other payment method like Visa, Mastercard or Skrill (former MoneyBookers).

13. Potential Security Issues

To play Forbidden Seas, the player have to create an account in our database. In this process it will be never asked to the user to insert sensitive data (in the italian meaning of the term) but only a few personal data like name, age, gender, e-mail and a password. These data will be then registered in our database. In the signup process it will be request to the player to read and confirm our Privacy Policy in which it will be described accurately the reasons and the modes with which the user's personal data will be used.
These data have also to be protected from malicious intruders, so to do this job it was think to introduce an hardware firewall in front of the web and login server that will have to filter and analyze the incoming requests to connection to it. This piece of hardware, in the middle between the internet and the server, will introduce a little additional latency in the login operation into the game but it's better than a simply software firewall, in the security point of view. It was chosen this server because it's the first machine exposed to the user, in fact it will connect directly to the main DB in order to gather the information necessary to the login, delivering a token to the user to connect to the game servers directly.
OVH offers a Cisco ASA firewall that can be connected directly to dedicated servers, which provides real-time protection against attacks from DOS applications, detection and filtering of network activity from worms and viruses, spyware, adware and malware detection.

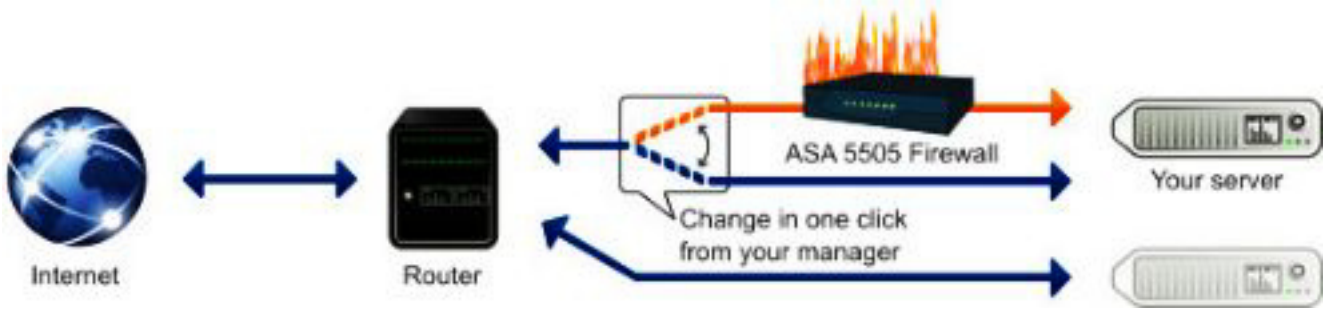


Fig. 13.1 OVH Hardware Firewall system

Instead inside the game server it will be set up a software firewall that first work in the application layer checking if the network traffic is allowed or not.

The DB rented from OVH is a NAS server that is equipped with RAID technology. So it enables data to be spread across multiple disks in order to increase security. The snapshots and backups carried out by OVH also strengthen our data security, thus guaranteeing 100% availability. Snapshots are instant images of data on the partition of our DB. It's possible to access the snapshots at any time and recover our data from the moment of the corresponding snapshot (for example, from 1 hour, 24 hours or 48 hours ago).

Based on the payment system chosen, it will be unnecessary to register any critical data that are potentially target of theft like credit card number.

13.1 Servers availability

The gaming/e-sports industries are especially prone to distributed denial-of-service attacks, especially UDP flood attacks, which exploit the User Datagram Protocol (UDP) - the protocol use by the majority of games and voice servers and also in Forbidden Seas.
All the OVH rented servers are equipped with a anti DDoS system designed specifically for gaming.
This service consist of a filter that analyses the incoming and outgoing traffic to better identify legitimate requests. It's capable of distinguishing real clients connecting to the machine from harmful attacks. It also plays the role of a cache and a filter for TCP/IP and UDP packets.

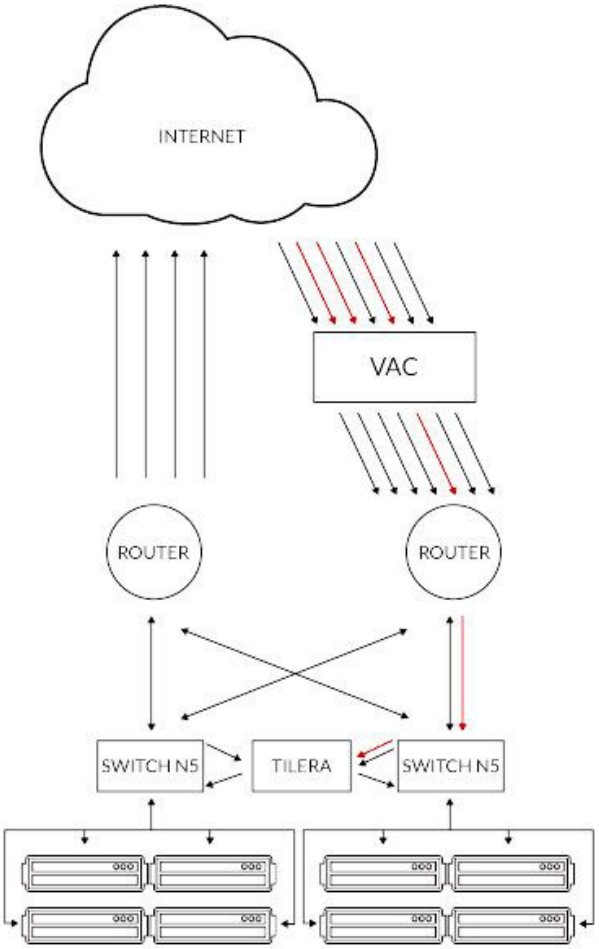


Fig. 13.2 Details of the Anti-DDoS infrastructure offered by OVH

14. Costs estimation

14.1 Total project cost

In the next pages will be described the estimated cost for each department illustred before. The costs has been divided in per year costs and one-off costs. Additional costs for the development department, like machines' maintenance and other, are not considered because every piece of hardware acquired will be under warranty at least for the first two years.

Hardware

Sector	Cost/Year	One-off Cost
Frontend	1187,88	1045
Backend	4847,64	3942
Development	0	16413,16
Other Services	0	5990
Total	6035,52	27390,16

Staff

Sector	Cost/Year	One-off Cost
Frontend	195000	0
Backend	325000	0
Development	236600	0
Other Services	341000	0
Total	756600	0

Variable cost
809778,94

Fixed cost
30519,37

Total/Year w/o Salaries
53178,94

Software

Sector	Cost/Year	One-off Cost
Frontend	0	0
Backend	0	0
Development	4104,28	3129,21
Other Services	291,14	0
Total	4395,42	3129,21

Building

Sector	Cost/Year	One-off Cost
Office	28800	0
Bills	3600	0
Cleaning	10000	0
Total	42400	0

Additional Cost/Year	
Paypal Pro	348
Total	348

Summary of total costs divided by use.

Hardware

Objects	Quantity	Price / Month	One-off Price	Total/Year	Total una tantum
OVH HOST-32L (standard configuration)	1	79,99	0	959,88	0
OVH Cisco ASA 5505	1	19	19	228	19
Workstation Dell Precision Tower serie 3420	1	0	926	0	926
Monitor Dell 19 E1916H	1	0	100	0	100
Total				1187,88	1045

Software

Objects	Quantity	Price / Year	One-off Price	Total/Year	Total una tantum
Linux CentOS	2	0	0	0	0
Apache WebServer	2	0	0	0	0
Total				0	0

Staff

Profession	Quantity	Price / Year	One-off Price	Total/Year	Total una tantum
System Engineer	3	65000	0	195000	0
Total	3	65000	0	195000	0

Hardware

Objects	Quantity	Price / Month	One-off Price	Total/Year	Total una tantum
OVH MC-64-OC	3	114,99	0	4139,64	0
OVH Storage NAS-HA da 1.2TB	1	59	0	708	0
Workstation Dell Precision Tower serie 3420	3	0	926	0	2778
Workstation Dell Precision Tower serie 3420 (base config)	1	0	764	0	764
Monitor Dell 19 E1916H	4	0	100	0	400
Total				4847,64	3942

Software

Objects	Quantity	Price / Year	One-off Price	Total/Year	Total una tantum
Linux CentOS	3	0	0	0	0
Postgresql	1	0	0	0	0
Linux Ubuntu 16.0	4	0	0	0	0
Total				0	0

Staff

Profession	Quantity	Price / Year	One-off Price	Total/Year	Total una tantum
System Engineer	5	65000	0	325000	0
Total	5	65000	0	325000	0

Hardware

Objects	Quantity	Price / Month	One-off Price	Total/Year	Total una tantum
Dell Precision Tower serie 5810 [Processore Intel Xeon E5-1650 v4]	2	0	1962	0	3924
iMac 27” 5K	1	0	2369	0	2369
Monitor Benq GW2406Z IPS da 23,8" Full-HD	5	0	128,99	0	644,95
Dell Precision Tower serie 5810 [NVIDIA® Quadro® M2000 da 4 GB]	3	0	1744,44	0	5233,32
Dell Precision Tower serie 3420 [Intel Core i7-7700 + ASUS Sound Car	1	0	1.225,30	0	1225,3
Additional Stuff	1	0	3016,59	0	3016,59
Total				0	16413,16

Software

Objects	Quantity	Price / Year	One-off Price	Total/Year	Total una tantum
Unity Pro License	2	1425	0	2850	0
Allegorithmic Substance Pack (Pro License < 100M)	3	0	834,57	0	2503,71
Adobe Photoshop CC (Photography Bundle)	3	145,57	0	436,71	0
Adobe Illustrator CC	1	292,57	0	292,57	0
audiokinetic Wwise (Pro License < 1.5M)	1	0	625,5	0	625,5
Asana Premium	7	75	0	525	0
Total				4104,28	3129,21

Staff

Profession	Quantity	Price / Year	One-off Price	Total/Year	Total una tantum
Programmer	3	33800	0	101400	0
3D Artist	3	33800	0	101400	0
Sound Designer	1	33800	0	33800	0
Total	7	101400	0	236600	0

Hardware

Objects	Quantity	Price / Month	One-off Price	Total/Year	Total una tantum
Notebook HP 15-ay105nl	10	0	599	0	5990
Total	10	0	599	0	5990

Software

Objects	Quantity	Price / Year	One-off Price	Total/Year	Total una tantum
Adobe Photoshop CC (Photography Bundle)	2	145,57	0	291,14	0
Total	2	145,57	0	291,14	0

Staff

Profession	Quantity	Price / Year	One-off Price	Total/Year	Total una tantum
Customer Support (Outsourced)	1	120000	0	120000	0
Game Master	6	19500	0	117000	0
Community Manager	2	26000	0	52000	0
Copywriter / Creative	2	26000	0	52000	0
Total	11	191500	0	341000	0

14.2 Estimated cost per user

To estimate the average server cost per user we need to know how much cost a server monthly. So based on the frontend and backend costs, we can say that the monthly cost of the frontend servers is 186,07€, and 732,47€ the backend. So we have a total cost of 918,54€ per month, that have to be divided by the total amount of active player per month, that we estimated be of 100000 users, so the average server cost per user would be 0,009€ per month.
This cost is based only on the server costs, but if we consider the total costs of the application (frontend, backend, development and other services), the monthly cost is 67452,58€, for a monthly total of 0,67€ per user.

14.3 Revenue estimation

The player doesn't need to pay the game to play it unlike other games, as Overwatch for example, that require to buy the product. So we could say that our game is a free to play game (F2P). The player could just pay for extra in game content, like skins, bundle or boost and use them while playing. That content would be released in different patches, so the amount of payable content will increase in time, and will be able to meet multiple users thanks to their variety. We have estimated that if every user spend an average of 1€ per month, we would reach a total revenue of 150'569€. This is just an estimation, considering the total costs estimation of the first year with the one-off costs.

TOP 10 ONLINE GAMES BY FREE-TO-PLAY EARNINGS—WORLDWIDE

SuperData Research

Rank	Title	Publisher	2013 Revenues (mil $)
1	CrossFire	Tencent/SmileGate	$957
2	League of Legends	Tencent/Riot Games	$624
3	Dungeon Fighter Online	Nexon	$426
4	World of Tanks	Wargaming.net	$372
5	Maplestory	Nexon	$326
6	Lineage I	NCSoft	$257
7	World of Warcraft	Activision/Blizzard	$213
8	Star Wars: The Old Republic	Electronic Arts	$139
9	Team Fortress 2	Valve	$139
10	Counter-Strike Online	Valve/Nexon	$121

Fig. 14.1 F2P games 2013 revenues

14.4 Break even estimation

We have estimated a total of 100000 users per month, if we consider the Average Revenue Per Monthly Active User (ARPMAU) of 0,98€, we could cover an year cost, including the one-off cost. This revenue per user include the cost imposed by Paypal on each transaction as illustrated in figure 14.3. Estimated an ARPMAU of 1€, in line with the other revenue of the TOP competitor in figure 14.2, we could reach the Break Even Point (BEP) in 11 month. But in this estimation we just consider that every user that play the game pay the ARPMAU amount since the beginning, but we know that in the first launch of the game, probably, the players want to test it and try it before spend money to buy extra features, like skin or boost, so the reaching of the BEP would be delayed by a few months.

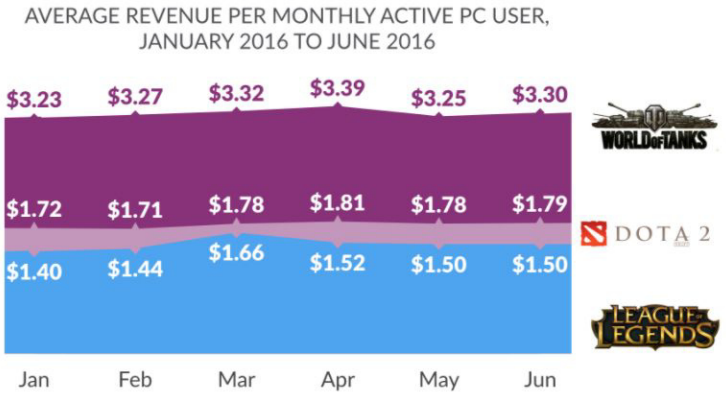


Fig 14.2 ARPMAU of three F2P MOBA games

Le tue vendite mensili*	€0 - €2.500	€2.500 - €10.000	€10.000 - €100.000	> €100.000,00
Per transazione	3,4% + €0,35	2,7% + €0,35	2,2% + €0,35	1,8% + €0,35
ONLUS	1,8% + €0,35			
Micropagamenti** (transazione media inferiore a €5)	5% + €0,10			
Pagamento cumulativo	2% fino ad un massimo di €6 per i pagamenti in Euro e €35 per i pagamenti in altre valute			
PayPal Pro (abbonamento mensile €29)	2,5% + €0,35	2,0% + €0,35	1,7% + €0,35	1,7% + €0,35

*La revisione della tariffa è soggetta ad approvazione ed è riservata agli utenti che hanno ricevuto pagamenti PayPal per oltre €2500 nel mese solare precedente.

**Valida nell'EEA (Area Economica Europea).

Lo schema delle tariffe è valido per pagamenti nazionali in euro. Se la transazione richiede una conversione di valuta, sarà applicato un tasso di cambio al dettaglio, pari al tasso di cambio all'ingrosso (stabilito da un istituto finanziario indipendente) più una tariffa di conversione valuta. Per saperne di più, consulta le Condizioni d'uso.

Fig 14.3 Cost of PayPal service