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5. **Introduction**

**The report is for a moderate sized company specialized in developing web applications and how it should be equipped with both appropriate hardware and install relevant software tools. The company is considered to operate both online and offline modes of work which gives its employees an opportunity to work both from home and at office. The company has a staff consisting of 100 employees who work in different departments such as project management, development and Q/A. The following table demonstrates data about the number of employees in each department and overall in the company, their qualifications, and the programming languages they will use as well as the IDEs and programmes in which they will work.**

**We analyzed the softwares used in most famous Uzbek companies, such as the Common republican processing center "UZCARD". According to them, their employees use Excel, Word, Visual Studio Code, and Postman. The preferred languages in those companies for each department are the following: HTML, CSS, JS, Python, Java and C# are used in the development department, Quality Assurance specialists use mainly Python. The company we are working for is made up of Project managers, Developers, devops, and Quality Assurance engineers departaments. We are planning to give a Linux operating system for senior specialists if they want it and for other specialists Windows Operating systems.**

| **Departments** | **The number of employees** | **The number of junior level employees** | **The number of middle level employees** | **The number of senior level employees** | **Type of programming/markup language(s)** | **IDEs and programmes to use** |
| --- | --- | --- | --- | --- | --- | --- |
| **Project management** | **10** | **5** | **3** | **2** | **None** | **Excel, word** |
| **Developers (Back-end and Front-end)** | **63** | **35** | **18** | **10** | **Python, Java, C#, HTML, CSS, Javascript..** | **VS code\*** |
| **System administration** | **5** | **2** | **2** | **1** | **None** | **Docker,** |
| **Q/A** | **10** | **6** | **2** | **2** | **Python** | **VS code\*, Postman** |
| **Overall number of employees** | | | | **100** | | |
| **Operating System used** | | | **Windows 11** | | | |

1. **Review of hardware and software solutions and tools**

**2.1. Hardware**

**2.1.1. Project management**

**Project managers will use Microsoft list and Google tables in their work. We will analyze if Project managers need moderate computer speed, memory and RAM. Normal storage and not good graphics is also ok for them. Ideal computers for project managers can be 4gb or 8gb RAM, 500 Gb Hard disk drive, 4 cores** [**(Victor R, 2022)**](#h4bdc6dz851p)**.**

| **Name and Price** | **Computer Config** | **Short description** | **Benefits** | **Limitations** |
| --- | --- | --- | --- | --- |
| **Project Management** | | | | |
| **Notebook HP 15S-EQ2075UR R5-5500U/8GB/SSD 256GB** | **Screen: 15**  **CPU: R5-5500U**  **RAM: 8GB**  **HDD: SSD 256GB**  **Wireless connection:**  **Bluetooth, Wifi**  **Interfaces: USB 3.1**  **Type A \* 2, USB 3.1**  **Type-C, HDMI out, Mic/**  **Headphones Combo** | **Ideal**  **laptop for**  **School, work**  **Or just home**  **Use. The pro-**  **Cessor**  **ensures**  **smooth**  **Operation of**  **Multiple office**  **programs** | * **Wireless connection** * **Good RAM size** * **Headphones** * **Compact** | * **Not very good RAM** * **Little screen**   [**[1]**](#4wis9ujf2eoe) |

**The R5-5500U is a hexa-core APU from the Lucienne line, designed for mid-range ultra-thin laptops. The processor was launched in the first half of 2021; The processor's six cores are based on the Zen 2 microarchitecture.**

**2.1.2. Development**

**Developers need high computer speed, memory and RAM. Normal storage and not good graphics is also ok for them. Ideal computers for developers can be 8gb or 16gb RAM, 1000 Gb Hard disk drive, 8 cores** [**(Sonmez, 2022)**](#prcoj4p8aiqh)**.**

| **Name and Price** | **Computer Config** | **Short description** | **Benefits** | **Limitations** |
| --- | --- | --- | --- | --- |
| **Developer** | | | | |
| **Monoblock Acer Aspire S24-880** | **CPU**  **Intel® Core™ i7**  **Processor type**  **i7-8550U (8MB**  **Cache, up to 4.0**  **GHz)**  **Color Black**  **RAM 16GB DDR4**  **HDD 2000GB HDD**  **Frame Plastic-Metal**  **Keyboard/mouse-**  **-Acer USB**  **video card-**  **-Intel HD Graphics**  **Screen diagonal 23.8"**  **Ports**  **-2 x USB 3.0**  **-2 x USB 2.0,**  **Interfaces WiFi**  **Operating system-**  **-Windows 10**  **Dimensions -**  **-489.7 x 362.5 x 11mm** | **Compact**  **Computer**  **Equipment**  **with**  **Wireless**  **charger is**  **available.** | * **Good RAM and HDD size.** * **Big screen** | * **Moderate Ghz**   [**[2]**](#dfoilqhes0ga) |

**The type of processor: i7-8550U means that the high-end laptop processor is very powerful without consuming power or needing large cooling systems. Its four cores and 15 watts of power consumption. The 8th Gen i7-8550U is also a significantly more powerful replacement for its previous 7th Gen i7-7500U dual-core counterpart.**

**2.1.3. Quality Assurance**

**Quality Assurance Engineers carry out the manual and automation testing phase of the projects. So they may initialize and check the project code on their computer. They need normal computer speed, memory, RAM, storage and good graphics. Ideal computer for Quality Assurance Engineer would have 8gb RAM, half GB hard disk drive, 30 to 300 frames per second graphic card, and 4 cores computer** [**(Beta Breakers, 2021)**](#2q0dw0lzno2v)**.**

| **Name and Price** | **Computer Config** | **Short description** | **Benefits** | **Limitations** |
| --- | --- | --- | --- | --- |
| **Quality Assurance Engineer** | | | | |
| **Notebook HP 455 G8 R3-5400U 8/256 GB** | **Screen: 15.6’’**  **Processor: AMD Ryzen**  **5400U**  **Ram: 8GB**  **Hard Disk 512 GB**  **Graphics Card: AMD**  **Radeon Graphics**  **Wireless: Bluetooth,**  **Wifi**  **Interfaces: USB 3.2**  **Gen1 Type-C, HDMI**  **Out, Combo**  **microphone**  **Headphones,**  **Ethernet - RJ-45**  **Webcam: 1** | **Compact**  **Computer**  **Equipment**  **with webcam,**  **Microphone,**  **Headphones.**  **It is very**  **comfortable**  **for Team**  **meetings** | * **Good RAM and HDD size.** * **Good screen size** * **Fast** | * **No accumulator** * **Specific gaming laptop**   [**[3]**](#m0ntede5e29j) |

**2.1.4. Devops**

**DevOps does unification and automation of processes. So they are instrumental in combining code, application maintenance, and application management. Therefore, devops need good speed, memory, RAM, and storage. Graphics card is not needed. Ideal computer for Devops would consist of primary 8gb RAM, 1 terabyte storage, and 6 cores** [**(Khwaja, 2020)**](#odyfkzghgup2)**.**

| **Name and Price** | **Computer Config** | **Short description** | **Benefits** | **Limitations** |
| --- | --- | --- | --- | --- |
| **Devops** | | | | |
| **Notebook Lenovo IP L3 15ITL6 I5-1135G7/8GB/****1000GB** | **Laptop Type**  **Screen 15.6", Full HD**  **1920x1080, IPS**  **Core I5-1135G7**  **Processor**  **RAM 8 GB**  **1000 GB Hard drive**  **The maximum refresh**  **rate of the screen is 60**  **Hz**  **Model of integrated Intel**  **UHD Graphics graphics**  **card**  **Webcam 1 MP (720p)**  **Battery capacity 38 Wh**  **The output power of the**  **power adapter is 65W** | **Compact**  **notebook**  **for office**  **work** | * **Good RAM size** * **Good HDD size** * **Good graphics card** | * **Lower refresh rate of the screen** * **Webcam is not in HD format** * **Low battery life**   [**[4]**](#yu2ejsz8341z) |

**The Intel Core i5-1135G7 is a quad-core mid-range SoC designed for use in ultralight notebooks. It has four Willow Cove CPU cores clocked at 2.GHz (base clock @ 28W TDP) and boost up to .2GHz (1-core boost).**

**2.1.5. Server**

| **Name and Price** | **Computer Config** | **Description** | **Benefits** | **Limitations** |
| --- | --- | --- | --- | --- |
| **Server** | | | | |
| **Cluster Server R2** | **Server SNR-SR1104R /**  **Intel Xeon E3-1220v5**  **(3 Ghz/8M/4-core)**  **Socket LGA2011-3 /**  **8GB (1x8GB) Crucial**  **2666MHz DDR4 ECC**  **Reg DIMM 1Rx8 / HDD**  **1 x 1TB Seagate**  **Enterprise Capacity,**  **7.2k 3.5″ SATA / Intel**  **i210 1GbE / RAID**  **0,1,5,10 (Intel RST) /**  **PSU 2 x 550W / Rack**  **(1U)** | **A group of**  **servers**  **working**  **together** | * **Increased resource availability** * **Strategic resource usage: You can distribute projects across nodes in whatever configuration you prefer.** * **Increased performance.** * **Greater scalability.** * **Simplified management.** | * **High cost**   [**[5]**](#d7q95ssxcgrq) |

**2.2. Software.**

**2.2.1. Devops**

1. **Option A (Basic) set.**

| **Name and Price** | **Minimum system requirements** | **Short description** | **Benefits** | **Limitations** |
| --- | --- | --- | --- | --- |
| **Devops (basic) 1** | | | | |
| **Jenkins**  **Price: Free** | **256 MB RAM**  **1 GB HDD (10 GB recommended)** | **Jenkins is open source Continuous Integration/Delivery and Continuous Deployment (CI/CD) software.** [**[6]**](#3yxikgw86pqj) | * **Easy to install** * **Community support** * **1000+ plugins** | * **Does not allow server-to-server federation** |

**On-premise DevOps improves an organization's ability to deliver high-velocity applications and services-developing and improving products at a faster pace than organizations using traditional software development and infrastructure management. The department may choose software tools such as Jenkins, Dynatrace, Docker, Circle CI, Apache Maven, Bamboo and TeamCity. Jenkins, Circle CI and TeamCity are used for integration and automation of different processes, including building, testing and deployment. Dynatrace is used to modernize and automate enterprise cloud operations, produce higher-quality software faster, and provide the customers with the best digital experiences possible. Docker is used to develop, ship and run applications. Apache Maven is used to manage a project’s builds, report and document from a central piece of information. Bamboo is used to release management software.**

**We are going to review Jenkins(basic) for the company's devops department. It is much easier to install than other alternatives and has more than a thousand plugins which allows it to integrate with most of the development, testing and deployment tools. Moreover, the software provides its users with higher community support. However, the fact that Jenkins doesn’t allow server- to-server federation, which can cause performance issues in large-scale environments, and system requirements mentioned above should be taken into account before exploitation.**

| **Name and Price** | **Minimum system requirements** | **Short description** | **Benefits** | **Limitations** |
| --- | --- | --- | --- | --- |
| **Devops (basic) 2** | | | | |
| **Docker**  **Price: Free** | **4 GB system RAM,**  **64-bit processing,**  **(windows 10), Windows Hyper-V and Container features, and BIOS-level hardware virtualization.** | **Docker is an open platform for developing, shipping, and running applications** | * **Caching a cluster of containers** * **Flexible resource sharing** * **Scalability - many containers can be placed in a single host** * **Running your service on hardware that is much cheaper than standard servers** | * **Docker is not good for application that requires rich GUI** * **It is difficult to manage large amount of containers**   [**[7]**](#9gdf6jwebru2) |

| **Name and Price** | **Minimum system requirements** | **Short description** | **Benefits** | **Limitations** |
| --- | --- | --- | --- | --- |
| **Devops (basic) 3** | | | | |
| **Apache Maven**  **Price: Free** | **HDD 10 MB, local repository 500 MB.** | **Maven is used to build and manage projects written in C#, Ruby, Scala, and other languages.**  [**[8]**](#9h2x3q6sm6df) | * **Helps manage all build, documentation, deployment and distribution processes in project management** * **Simplifies the process of project building** * **Increases the performance of the project and the building process** | * **Maven must be installed on the working system and the Maven plugin in the IDE** * **Some sources claim that Maven is slow**   [**[9]**](#4k1b644tmnzt) |

1. **Option B “Premium” set.**

| **Name and Price** | **Minimum system requirements** | **Short description** | **Benefits** | **Limitations** |
| --- | --- | --- | --- | --- |
| **Devops (premium) 1** | | | | |
| **Dynatrace**  **Price: $74** | **CPU 2Ghz, 32GB of RAM, 64-bit OS.** | **Dynatrace is an all-in-one platform designed for a variety of use cases. Monitoring of infrastructures. Dynatrace provides streamlined and automated infrastructure monitoring, giving you deep visibility into hosts, virtual machines, containers, networks, events, and logs.** [**[10]**](#kix.dgjj517sqnl) | * **Easier to install than other alternatives** * **has real time alerts and synthetic monitoring of online or cloud-based apps, as well as proper tracking and monitoring.** | * **Without an expert guidance, unfamiliarity with the product will be a barrier.** * **It is limited for customization and integration with third party tools**   [**[11]**](#sumc0d9rfa72) |

| **Name and Price** | **Minimum system requirements** | **Short description** | **Benefits** | **Limitations** |
| --- | --- | --- | --- | --- |
| **Devops (premium) 2** | | | | |
| **Circle CI**  **Price: $2000** | * **CPU: 4 cores.** * **RAM: 32GB.** * **Disk space: 100GB.** * **NIC speed: 1Gbps.**   [**[12]**](#6m2deifu1lse) | **CircleCI is a cross-platform platform for continuous integration and continuous delivery (CI/CD) and a central hub for taking code from idea to delivery. It's a DevOps tool that processes over a million builds a day and has access to data about how engineering teams are performing and how their code is running.** [**[13]**](#lvqec7uygyy) | * **Easy to instal** * **Higher quality of support than other alternatives** * **Easier to use and understand** | * **Speed is lower than other alternatives**   [**[14]**](#o0kdrn4nb42v) |

| **Name and Price** | **Minimum system requirements** | **Short description** | **Benefits** | **Limitations** |
| --- | --- | --- | --- | --- |
| **Devops (premium) 3** | | | | |
| **Team city**  **Price: $1999** | **Intel 3.2 GHz dual-core CPU, 8 GB memory under Windows, 1 GB network adapter, and single HDD** [**[15]**](#cin797lnwspz) | **TeamCity is a build management and continuous integration tool that supports multiple version control systems and build runners. The TeamCity server manages committed code changes and live build information received from build agents and build artifacts.** [**[16]**](#v47cf53ruczj) | * **Provides several ways to reuse the original project configuration in subprojects.** * **Can detect builds which are hung.** [**[17]**](#1q8yy06tuuze) * **More user-friendly** | * **Lesser community support.** * **Complex user interface for new users.** * **Upgrading to another version is quite tedious.** [**[18]**](#t033hhf700xd) |

| **Name and Price** | **Minimum system requirements** | **Short description** | **Benefits** | **Limitations** |
| --- | --- | --- | --- | --- |
| **Devops (basic) 4** | | | | |
| **Bamboo (2)**  **Price: Free** | **4 Core, 4 GB RAM, HDD 140 MB.** | **Bamboo is a Continuous Integration (CI) server that can be used to automate software application release management and create persistent delivery pipelines.** | * **Accurate Reporting** * **Applicant Tracking System** * **Centralized Employee Database** | * **Payroll processing** * **User experience** * **Internet connections**   [**[19]**](#qfqhcm4op8df) |

**2.2.2. Project management**

**a) Option A (Basic) set.**

**Project management department provides the direction and standards for project implementation. They set specific goals that are in line with the overall vision of the organization and ensure that all goals are achieved. The instructions are presented in the form of project templates, standardized processes, training and methodological advice. Project management software list consists of Teams , Nifty, Clickup, Excel, Asana, Jira. Teams , Nifty. Clickup is used for real time collaboration, file and app sharing, communication, managing tasks, direct massaging, and documentation. Excel and Asana are used for formatting, calculating and organizing data. JIra is used for sprint planning and issue time estimation.**

| **Name and Price** | **Minimum system requirements** | **Short description** | **Benefits** | **Limitations** |
| --- | --- | --- | --- | --- |
| **Project manager (basic) 1** | | | | |
| **Teams**  **Price: Free** | **Windows 10 is required** | **Microsoft Teams is a collaboration app designed for collaborative work, so you and your team can stay informed, organized, and connected in one place.** | * **Unlimited one-on-one meetings for up to 30 hours** * **Unlimited group meetings for up to 60 minutes** * **Up to 100 participants per meeting** | * **Limited meetings for only up to 30 hours** * **Limited group meetings for up to 60 minutes** * **Only 100 participants per meeting** * **Only 5 GB of cloud storage per user** [**[20]**](#qbja3a1w7se9) |

| **Name and Price** | **Minimum system requirements** | **Short description** | **Benefits** | **Limitations** |
| --- | --- | --- | --- | --- |
| **Project manager (basic) 2** | | | | |
| **Excel**  **Price: Free** | **Windows 10, a 1 GHz or faster processor, 1 GB (32-bit) or 2 GB (64-bit) of RAM, 16 GB of free hard disk space, Microsoft DirectX 9 graphics device with WDDM driver, a Microsoft account and Internet access.** [**[21]**](#kix.xlbv6lwxvz6r) | **Microsoft Excel allows users to format, organize, and calculate data in spreadsheets. By organizing data with programs like Excel, data analysts and other users can more easily see information as data is added or changed. Excel contains a large number of fields called cells, which are arranged in rows and columns.**  [**[22]**](#kix.1sn08iohevbd) | **The Best Way to Store Data****You can perform calculations**  * **All the tools for data analysis** * [**Easy to Create Data Visualizations with Charts**](https://excelchamps.com/benefits-of-microsoft-excel/#4_Easy_to_Create_Data_Visualizations_with_Charts) * [**You can Print Reports Easily**](https://excelchamps.com/benefits-of-microsoft-excel/#5_You_can_Print_Reports_Easily) | * **Low column width** * **Low row height** * **Low number of characters in header and footer**   [**[23]**](#kix.6d4v5l2hij0k) |

| **Name and Price** | **Minimum system requirements** | **Short description** | **Benefits** | **Limitations** |
| --- | --- | --- | --- | --- |
| **Project manager (basic) 3** | | | | |
| **Jira**  **Price: Free** | **a recent server (multicore CPU) with 8GB of available RAM and a reasonably fast hard drive (7200 rpm or faster)** | **Jira is an agile business management solution that supports cross-team collaboration from concept to customer, enabling you to do the best work of your life together. Jira offers a variety of products and publishing options, designed for software, IT, business, operations, and more.**  [**[24]**](#kix.m6lehej7b5pl) | * **Built for Agile and Scrum management. Jira Software primarily focuses on Agile project management – offering features that are geared towards Scrum and Kanban methodologies. ...** * **Great for issue management. ...** * **Highly customizable.** | * **The tool is hard to set up and get used to.** * **It's complicated user interface can make managing tasks difficult.** * **No built-in timeline to track your project progress.** * **No collaboration features to communicate with your team.** * **It's mainly built for engineering and software development teams.** [**[25]**](#bhd6rkn0yx7) |

**b) Option B “Premium” set.**

| **Name and Price** | **Minimum system requirements** | **Short description** | **Benefits** | **Limitations** |
| --- | --- | --- | --- | --- |
| **PM (premium) 1** | | | | |
| **Nifty**  **Price: $39 for 10 members**  **79$ for 25 members**  **124$ for 50 team members** | **OS**  **Windows 8.1 64-bit or Windows 10 64-bit**  **GPU**  **GTX 1050**  **CPU**  **i3-8300**  **Memory 8GB RAM**  **Storage**  **1GB available space** | **Nifty is an online project management and collaboration platform that helps teams simplify task activities, facilitate team communication, and streamline workflows.** [**[26]**](#88l5vjiiivrx) | **Effective team collaboration****Multiple project views to work with data****Imports and integrations** | **no custom automation****no dashboard for visual insights****no PDF annotation** [**[27]**](#vmglkgd5cuw8) |

| **Name and Price** | **Minimum system requirements** | **Short description** | **Benefits** | **Limitations** |
| --- | --- | --- | --- | --- |
| **Project Manager (premium) 2** | | | | |
| **Clickup**  **Price: $19** | **None** | **ClickUp is an all-in-one productivity platform.**  **It's a hub where teams come together to plan, organize and collaborate on work using tasks, documents, chat, goals, whiteboards and more. Easily configurable with just a few clicks,**  **ClickUp enables teams of all shapes and sizes to work more efficiently and take their productivity to new levels**  **.** [**[28]**](#hn8w3fxpiqd1) | * **Multiple Views.** * **Customization Capabilities.** * **Team Collaboration & Communication.** * **Real-Time Reporting.** * **Time Tracking Capabilities.**   [**[29]**](#u0fyln5er82n) | * **More robust timekeeping** * **More intuitive dashboards** * **More direct integrations**   [**[30]**](#e7zrscsfj1au) |

| **Name and Price** | **Minimum system requirements** | **Short description** | **Benefits** | **Limitations** |
| --- | --- | --- | --- | --- |
| **Project Manager (premium) 3** | | | | |
| **Asana**  **Price: $24** | **None** | **Asana (/əˈsɑːnə/ or /ˈɑːsənə/) is a web and mobile "work management platform" designed to help teams organize, track, and manage their work.** [**[31]**](#hdn5ep9byrsy) | * **increases accountability on customer’s team** * **helps customers communicate about work more easily.** * **helps customer’s team meet deadlines** [**[32]**](#wykujrtkux0) | * **No Time Tracking Features** * **Requires Some Experience.** * **Assignments Are Limited.**   [**[33]**](#dkkeky2gigg9) |

**2.2.3. Development**

**In this department, full stack developers are responsible for the design and development of websites and platforms. They work with the design team to ensure that user interactions on web pages are intuitive and engaging. They also provide background functionality that works seamlessly from any type of device or browser commonly used today.**

**a) Option A (Basic) set.**

**The list of developer programs includes The Jupyter Notebook, Pycharm, VS Code, GitHub, Git, and Desktime. Jupyter Notebook, a web application for creating and sharing computer documents. Pycharm is used to create an environment conducive to efficient Python, Web and Data Science development. VS Code is used for debugging, task execution, and version control. GitHub is used to store, track, and collaborate on software projects. Git is used to track the state of your code and support codebase collaboration. DeskTime is used to record time and improve time efficiency.**

| **Name and Price** | **Minimum system requirements** | **Short description** | **Benefits** | **Limitations** |
| --- | --- | --- | --- | --- |
| **Developers (basic) 1** | | | | |
| **The jupiter notebook**  **Price: Free** | **1GB RAM + 1GB of disk + . 5 CPU core.**  **Port 8000 plus 5 unique, random ports per notebook.** [**[34]**](#9wscwii67sm0) | **Jupyter Notebook is an open-source web application designed to allow users to create and share documents that contain live code, equations, visualizations and narrative text** | * **Free.** * **Easy start-up, just type juptyer notebook in your terminal.** * **Visualization display (user interface)**   [**[35]**](#ly06j5p5qfl2) | * **It is very hard to test long asynchronous tasks.** * **Less Security.** * **It runs cell out of order.** * **In Jupyter notebook, there is no IDE integration, no linting, and no code-style correction.**   [**[36]**](#1t278vhimfgy) |

| **Name and Price** | **Minimum system requirements** | **Short description** | **Benefits** | **Limitations** |
| --- | --- | --- | --- | --- |
| **Developers (basic) 2** | | | | |
| **VS code**  **Price: Free** | * **1.8 GHz or faster 64-bit processor; Quad-core or better recommended. ...** * **Minimum of 4 GB of RAM. ...** * **Windows 365: Minimum 2 vCPU and 8 GB RAM. ...** * **Hard disk space: Minimum of 850 MB up to 210 GB of available space, depending on features installed; typical installations require 20-50 GB of free space.** [**[37]**](#q13agbs0v53v) | **Visual Studio Code, also known as VS Code, is a source code editor for Windows, Linux, and macOS built by Microsoft using the Electron framework. Features include debugging support, syntax highlighting, smart code completion, code snippets, code refactoring, and built-in Git.**  [**[38]**](#p9id2wn99zp) | * **Cross-platform support : ...** * **Light-weight.** * **Robust Architecture.** * **Intelli-Sense.** * **Freeware: Free of Cost- probably the best feature of all for all the programmers out there, even more for the organizations.** | * **Sometimes you need to install and customize your own plugins and you may get a little lost."** * **"Initial bad compatibility with M1 Macs, some versions kept freezing a lot, unexpected quits, strange behavior when on a collaboration session."**   [**[39]**](#v7ilczhwg7y) |

| **Name and Price** | **Minimum system requirements** | **Short description** | **Benefits** | **Limitations** |
| --- | --- | --- | --- | --- |
| **Developers (basic) 3** | | | | |
| **Git**  **Price: Free** | * **512MB RAM + 1.5GB of swap is the absolute minimum but we strongly advise against this amount of memory. ...** * **1GB RAM + 1GB swap supports up to 100 users but it will be slow.** * **2GB RAM is the recommended memory size and supports up to 100 users.** * **4GB RAM supports up to 1,000 users.** * **8GB RAM supports up to 2,000 users.** [**[40]**](#kix.lnro9t6cjhh) | **Git (/ɡɪt/) is free and open source software for distributed version control: tracking changes in any set of files, usually used for coordinating work among programmers collaboratively developing source code during software development.** [**[41]**](#kix.2u5e2920acxl) | * **Good distributed model as each developer gets a local repository with a full history of commits which makes git fast compared to other VCs.** * **Branching capabilities and merging are easy (as they are cheap), good data integrity.** | * **GIT requires technical excellence and it is slower on windows. They have tedious command lines to input and don’t track renames.** * **They have poor GUI and usability. And also, they take a lot of resources which slows down the performance.**   [**[42]**](#kix.tc59o1a1jhpy) |

**b) Option B (Premium) set.**

| **Name and Price** | **Minimum system requirements** | **Short description** | **Benefits** | **Limitations** |
| --- | --- | --- | --- | --- |
| **Developers (premium) 1** | | | | |
| **Pycharm**  **Price:**  **Business: 199$ (1st year) 159$ (2nd year)**  **Individual: 89$ (1st year), 71$ (2nd year)** | * **64-bit versions of Microsoft Windows 10, 8, 7 (SP1)** * **4 GB RAM minimum, 8 GB RAM recommended.** * **1.5 GB hard disk space + at least 1 GB for caches.** * **1024×768 minimum screen resolution.** * **Python 2.7, or Python 3.5 or newer.** [**[43]**](#2ke5ga7soo4z) | **PyCharm is a Python integrated development environment (IDE) that provides Python developers with a broad set of tightly integrated core tools to efficiently create a convenient environment for Python, web, and data science development..** [**[44]**](#nj4u9cf1gpi0) | * **Installing PyCharm is very easy.** * **is an IDE that is easy to use.** * **There are a lot of useful plugins and productive shortcuts in PyCharm.** * **It integrates library and IDE features such as auto-completing and coloring.** | * **it takes more space than other text editors which degrade the functionality of code..** * **It can be complicated for beginners to set a virtual environment variable and thus they might not prefer to use it.**   [**[45]**](#ynwmyclmlw7g) |

| **Name and Price** | **Minimum system requirements** | **Short description** | **Benefits** | **Limitations** |
| --- | --- | --- | --- | --- |
| **Developers (premium) 2** | | | | |
| **Github**  **Price: $21** | **1.4 GHz (64-bit processor) or faster for single core 1.3 GHz (64-bit processor) or faster for multi-core,**  **2GB RAM, 160 GB hard disk with a 60 GB system partition** [**[46]**](#jkuje6bz66on) | **GitHub is where the world builds software. Millions of people, organizations, and businesses around the world use GitHub to discover, share, and contribute to software. Developers from startups to Fortune 50 companies use GitHub every step of the way.** [**[47]**](#ni2xnsiv6e4t) | * **makes it easy to contribute to your open source projects** * **Documentation** * **Showcase your work** * **Track changes in your code across versions**   [**[48]**](#zf3v30o87g4b) | * **Cyber threats – hacker attacks. ...** * **Malware uploaded to GitHub. ...** * **Team members negligence.**   [**[49]**](#79c2njfya5kb) |

| **Name and Price** | **Minimum system requirements** | **Short description** | **Benefits** | **Limitations** |
| --- | --- | --- | --- | --- |
| **Developers (premium) 3** | | | | |
| **Desktime**  **Price: $20** | **GNU/Linux - Ubuntu.**  **20.04.2 LTS Focal Fossa, GNOME 3 desktop environment, X11 windowing system, x64. AppImage, deb.**  [**[50]**](#m4nz63y7c72n) | **DeskTime is a desktop and mobile time tracking app for businesses and freelancers. It facilitates productivity measurement, performance improvement, attendance tracking and efficient workflow management. DeskTime has been proven to increase employee productivity by 30% within the first few weeks of use.**  [**[51]**](#ck888f2tvxh2) | * **Auto Screenshot Function.** * **Productivity Analysis.** * **Projects & Tasks Management.** * **Common Absence Calendar.** | * **Ease of setup** * **Higher quality of support**   [**[52]**](#ihykad6hgo8b) |

**2.2.4. Quality Assurance**

**Quality assurance department defines and maintains specific requirements for developing or manufacturing reliable products. The quality assurance system should increase customer confidence and the company's reputation, while improving workflow and efficiency, and allowing the company to better compete with other companies.**

1. **Option A (Basic) set.**

**The list of QA engineering software includes Selenium, Postman, Ranorex Studio, PMD, Lambda Testing, and Sauce Labs. Selenium, lambda testing and sauce labs are used to automate testing. Postman, Ranorex Studio for manual testing of web applications, PMD for code analysis, mainly for white box testing.**

| **Name and Price** | **Minimum system requirements** | **Short description** | **Benefits** | **Limitations** |
| --- | --- | --- | --- | --- |
| **Quality Assurance Engineer (basic) 1** | | | | |
| **Selenium**  **Price: Free** | * **A 64-bit operating system like Windows 7 or later.** * **Microsoft Internet Explorer 9.0 or later.** * **Intel Core i5 or Intel Core i7 (the 3rd generation).** * **8 GB of RAM or more.** * **2 GB of free disk space for installation, plus extra space for temporary files during test runs (see below).** [**[53]**](#c79rbk6sxhtj) | **Selenium is an open source tool for automating web browsers. It provides a single interface that allows you to write test scripts in programming languages ​​such as Ruby, Java, NodeJS, PHP, Perl, Python, and C#.**  [**[54]**](#v9o01ohiandf) | * **Open-Source:** * **Supports Operating Systems:** * **Support across browsers:** * **6.Tests across devices.** * **7.Constant updates.** * **9.Ease of implementation.** * **10.Reusability and Add-ons.**   [**[55]**](#8m26uxjkah8s) | * **Testers need more time to write test cases. ...** * **Does not provide any test management tool. ...** * **Lacks built-in reporting feature. ...** * **Supports only a single browser. ...** * **Lacks some of the advanced latest features. ...** * **Testing of Image-based web applications. ...** * **Testing mobile apps. ...** * **Handling dynamic elements. [**[**56]**](#3yr6bqwm43u9) |

| **Name and Price** | **Minimum system requirements** | **Short description** | **Benefits** | **Limitations** |
| --- | --- | --- | --- | --- |
| **Quality Assurance Engineer (basic) 2** | | | | |
| **Postman**  **Price: Free** | * **Mac OS X: OS X El Capitan (10.11+), including macOS Monterey.** * **Windows: Windows 7 and later are supported. Older operating systems are not supported (and do not work).** * **Linux: Ubuntu 14.04 and newer, Fedora 24 and newer, and Debian 8 and newer.** [**[57]**](#xwf4vt3iogi4) | **Postman: Postman is an Application Programming Interface (API) development tool for creating, testing, and modifying APIs. Almost every feature a developer might need is wrapped in this tool. More than 5 million developers use it every month to simplify their API development.** [**[58]**](#8ba1aw1vgpb3) | * **Easy to create, share, test, and document APIs.** * **Store information for running tests in different environments.** * **Store data for use in other tests.** * **Integrates with build systems.** * **Easy to move tests and environments to code repositories.** * **Good UI.**   [**[59]**](#xl5gdbsfu30l) | * **What are the limitations of Postman?** * **Postman Monitors are incapable of handling Global variables. While creating a Monitor, we have to copy all the Global variables as local ones within a newly created Environment. The free version of Postman Monitor can only help us to get familiarized with its features.** [**[60]**](#rlo45x199lea) |

| **Name and Price** | **Minimum system requirements** | **Short description** | **Benefits** | **Limitations** |
| --- | --- | --- | --- | --- |
| **Quality Assurance Engineer (basic) 3** | | | | |
| **PMD**  **Price: Free** | **Processor:3.3 GHz or higher,**  **RAM: 16 GB or more ECC RAM recommended PDM Contributor / Viewer or Electrical Schematic: 8 GM or more,**  **Graphics Card:Certified Graphics Cards,**  **Drives SSD drives recommended for optimal performance** | **PMD is an open source static code analyzer that reports problems in application code. PMD includes a built-in ruleset and supports the ability to write custom rules. PMD does not report build errors because it can only handle well-configured source files.** [**[61]**](#kix.4nt5cki5v6uq) | * **Continuous integration** * **Immediate feedback** * **Customizing the rules** | * **High RAM requirement** * **Requires graphic card** |

1. **Option B (Premium) set.**

| **Name and Price** | **Minimum system requirements** | **Short description** | **Benefits** | **Limitations** |
| --- | --- | --- | --- | --- |
| **Quality Assurance Engineer (premium) 1** | | | | |
| **Ranorex Studio L**  **Price: $3950** | * **. NET Framework 3.5SP1 and Windows XP or later, 512MB RAM** * [**[62]**](#bx5em5yjus6g) | **Ranorex Studio is an automated testing solution designed to help businesses create, run, and publish tests for mobile, web, and desktop applications.** [**[63]**](#d3lgv25q4t1l) | * **Multi-Platform Testing.** * **Test Without Coding. ...** * **User-Friendly UI. ...** * **Image Tracking.** | * **Paid License. ...** * **Limited Support Languages. ...** * **Lacks macOS Support. ...** * **Lacks Community Support. ...** * **Irregular Updates.** [**[64]**](#j47hp2n8stvo) |

| **Name and Price** | **Minimum system requirements** | **Short description** | **Benefits** | **Limitations** |
| --- | --- | --- | --- | --- |
| **Quality Assurance Engineer (premium) 2** | | | | |
| **Sauce labs**  **Price: $399** | **Windows 10 and higher**  **CPU arch x86**  [**[65]**](#6b5gry36h60p) | **Sauce Labs enables users to run tests in the cloud on more than 700 browser, operating system and device platforms, providing manual and automated testing of desktop and mobile applications using Selenium, Appium and JavaScript unit testing frameworks. Comprehensive testing infrastructure.** [**[66]**](#r0torbctgxpk) | * **Powerful and Valuable Cloud-based Capabilities. ...** * **Automated Testing. ...** * **Detect and Resolve App Development Issues Fast. ...** * **Open Source Coding.** [**[67]**](#g9u0k1nfnaho) | * **Ease of admin** * **Ease of setup**   [**[68]**](#1az7r4wqj1g8) |

| **Name and Price** | **Minimum system requirements** | **Short description** | **Benefits** | **Limitations** |
| --- | --- | --- | --- | --- |
| **Quality Assurance Engineer (premium) 3** | | | | |
| **Lambda Test**  **Price: $158** | * **CPU: Info.** * **CPU SPEED: Dual core from Intel or AMD at 2.8 GHz.** * **RAM: 2 GB.** * **OS: Windows® 8 / Windows® 7 / Vista / Vista64.** * **VIDEO CARD: nVidia Geforce 8600GT, AMD Radeon HD2600 or better.** * **PIXEL SHADER: 4.0.** * **VERTEX SHADER: 4.0.** * **SOUND CARD: Yes.**   [**[69]**](#lhz2qgtk7jq4) | **LambdaTest is a cloud-based platform that helps users perform manual and automated testing of their websites and mobile applications. Users can test native mobile apps (Android and iOS) and mobile websites on real devices in the cloud, or choose between emulators and emulators for different configurations.** | * **Reliable and Consistent Software Releases. ...** * **A Great platform for automation testing! ...** * **Gateway to scalable cross browser testing. ...** * **Test Automation made easy.**   [**[70]**](#ipirlc3qpol) | * **Less user-friendly than other alternatives**   [**[71]**](#emmq5l5uzamt) |

**3. Justification and recommendations**

**We recommend not choosing cloud hosting but rather choosing a cluster server as it helps to manage data more effectively. Moreover, we can have different types of hosting websites such as production and test servers. We believe that buying Notebook HP 15S-EQ2075UR R5-5500U/8GB/SSD 256GB for Project Managers would be a great choice. Because it is a comfortable computer for office work, and meets all needs of project managers and using recommended software like installing and running them. We recommend Monoblock Acer Aspire S24-880 for Developers as it has enough memory and RAM capacity for running the programs locally, and see the results in different browsers and environments. It can also meet minimum requirements for the chosen software. We recommend buying Notebook HP 455 G8 R3-5400U 8/256 GB for Quality Assurance engineers as they also write code for automation and manually test the software. Moreover, they do static testing, which is testing the code directly using text editors. The hardware for Quality Assurance engineers should meet all requirements of chosen software, be able to initialize the code locally, and the recommended hardware meets those requirements. Notebook Lenovo IP L3 15ITL6 I5-1135G7/8GB/1000GB for Devops as it satisfies most of the job requirements, including monitoring and maintaining the projects on the server. Software for project managers include Teams, Excel, Jira as it satisfies with collaboration, management, and task monitoring. Software for developers include VS Code , Pycharm, Git, and Github as they satisfy all job requirements, including writing code, collaborating on github, writing python code in pycharm. Software for Quality Assurance Engineers include Selenium, Postman and PMD as it satisfies most of the job requirements including black-box, white-box, manual and automation testing. Software for Devops include Jenkins, Dynatrace, Docker, Apache Maven, Bamboo as it fulfills all job requirements including digital experience, artificial operating system, manages builts, reports, documents from central piece of information, and it also releases management of software.**

**4. Conclusion**

**We conclude that the hardware and software recommended fits the company very well. Most of the software recommended is not used by most Uzbek companies. This makes the company very competitive not just in the Uzbek market but also in the world market. The report is made considering that the company has a big potential and huge way to grow. The recommended server is a cluster server with one node and one node with its own hard disk, RAM, and CPU resources to monitor. If one server in the cluster fails, work can easily be moved to another server. Aggregation reduces downtime and interruptions when another server takes over. Work is not interrupted, and users can easily access server-related resources at any time. Graphic designers will be employed in the freelance employment system that means only working and paying when the specific job is accomplished. We do not have to employ them and pay salaries for them individually. We are employed by a moderate sized company and fulfilled all requirements needed for the company.**

**5. Links**

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