

Peer to Peer IT Broker

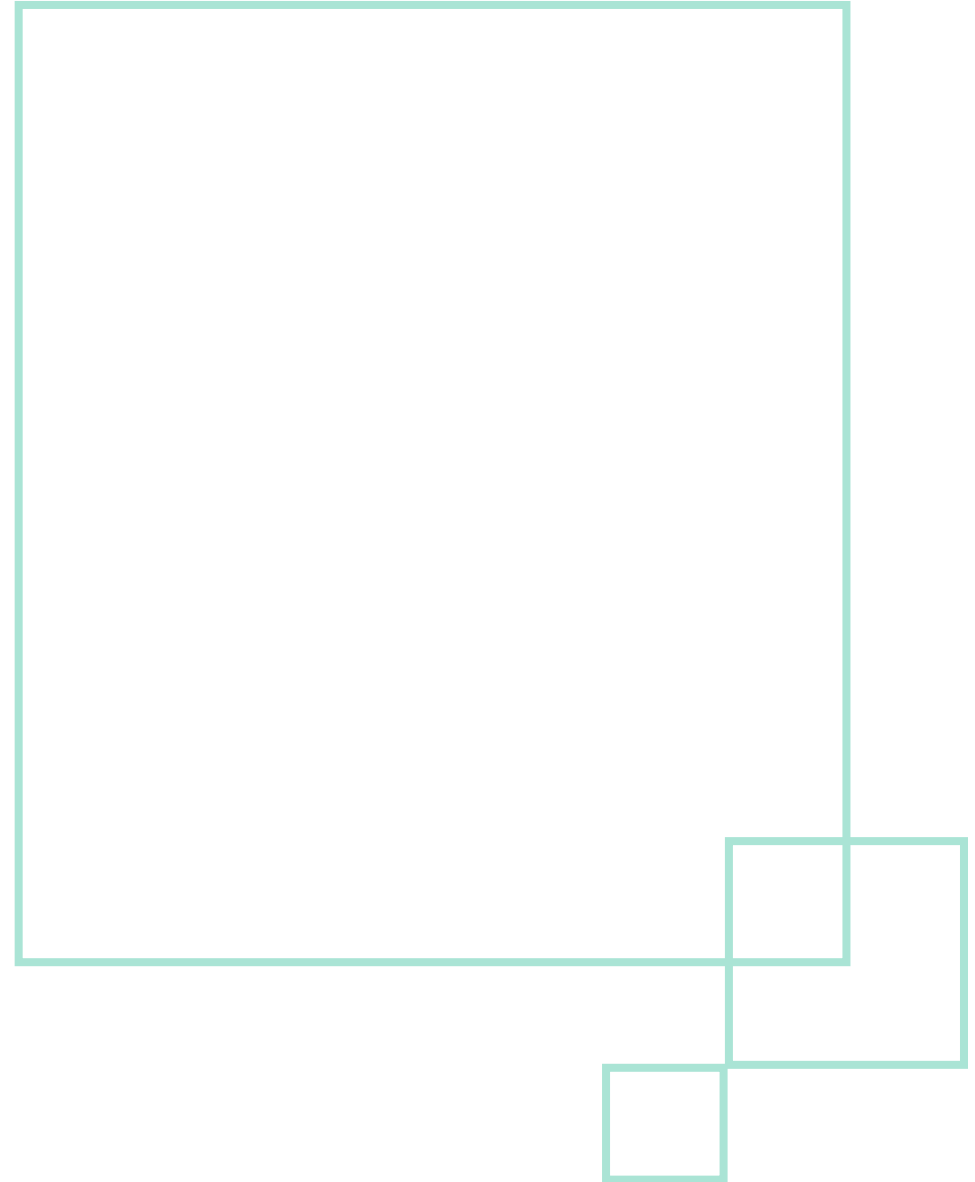
by Annu
(176330009)

Senior interaction design - P1

Acknowledgment

This project of creating a solution for peer to peer IT provisioning was conducted under the guidance of Jigar Kapasi and Dr. Deepak Poola Chandrashekhar at GTS Labs, IBM, Bangalore. Their mentorship and guidance has greatly influenced the completion of this project for which I'm thankful. I also extend my gratitude to the entire GTS labs team for participating and aiding me throughout the project.

This project wouldn't have been possible without the help of Titas Sarkar and Vikas Kumar Chaurasia who were part of this project along with me. Their inputs and general assistance throughout the different stages of the project is greatly appreciated. I would also like to thank the design team for providing with the necessary resources and guidance.



1

Introduction

Organisations working in IT sector require multiple machines (infrastructure) and IT services for their softwares or applications to be deployed upon. There are multiple cloud providers in the market like Amazon cloud AWS, Microsoft's cloud Azure and IBM's Cloud provider called as Softlayer. These cloud providers provide machines which are cost optimized and are also effective in terms of their working and health.

For a workload owner to differentiate between multiple cloud provider is a task as he/she does not possess the ability to select a machine as per his/her requirement hence they opt for IT brokers which also helps them with additional services on their cloud machines.

The current functionalities of IT broker is as following :-

1. Broker access to multiple clouds from a single provider
2. Automatically provision cloud resources to speed up the development
3. Complete visibility and governance over your cloud use
4. Optimise cost, take actions to cut the costs.

A traditional IT broker will give you services to manage your public and private clouds. But in a traditional IT brokerage system, there is a dependency on a middle man to get the provisioning done which in turns brings the question of trust between two parties. With this project, we aimed to create a solution where there is no dependency on a middle man to get any services. Also the system becomes transparent such that all the participants are able to trust each other with the cost and performance.

Configuration and service management has been handled traditionally using tools such as CM systems like ServiceNow, and internal IT department or outsourced to providers etc. Expensive discovery and monitoring systems have been used by the client to get the Cis and the state of the service. Additional resources and manpower have to be employed to manage incidents , problems or change requests if any. This in turn has resulted in the complication of the entire service management stack along with the problems of managing a team of skilled professionals that address the incidents, etc.

Using the proposed solution, the workload owner will be able to submit their IT architecture work requests. The request will then go to solutioning team which our solution has termed as solution provider and this team will review and create a realization of the work request i.e. the request that has been submitted by the customer. Now Service providers which are different from the solutioning team will provide smart contracts(Legal bound logic) to manage the lifecycle of the Cis that they provide and store it on the ledger. There might be service provide that can provide relationships between different Cloud providers as well.

With growing use of Xaas (Anything as service) in composing a business stack there is an opportunity to reduce the complexity. This way each of the cloud service provider and IT service provider will enhance their services to the consumers by participating in IT service blockchain. Implementing the above system with blockchain

2

What is Blockchain ?

Blockchain is the new 'in' thing that is beginning to take the tech world by a storm. In the years to come, Blockchain will play a central part of most of the transactions that happen in this world. Blockchain technology has the power to provide a platform to remove middlemen, regardless of the industry. With blockchain a solution appears transparent, which in-turn increase the users trust on the platform and help get users do more transactions without a doubt in their mind. The most important thing that differentiates a blockchain from a normal database is that there are some specific rules as to how to put data into the database. That is, it cannot conflict with some other data that's already in the database, it's append-only, and the data itself is locked to an owner, it's replicable and available. Finally, everyone agrees on what the state of the things in the database are without a central third party. Hence we can say that the data in a blockchain is consistent, immutable, own-able, canonical and decentralised.

It can help provide logical separations between different personas, it provides a distributed environment between different collaborators and providers where bids are stored securely, however they are not visible to each other. In order to maintain the proof, smart contracts are used as irrefutable proof and thus making the broker invisible.

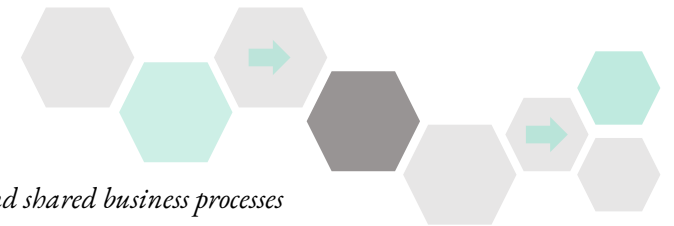
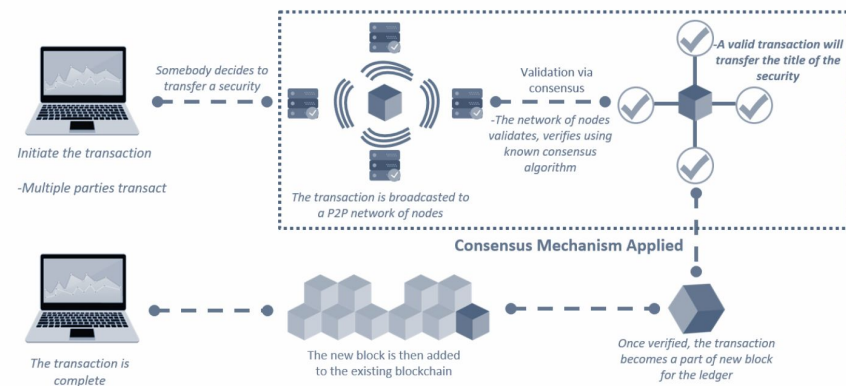


Fig 1: Blockchain has a trusted distributed ledger and shared business processes

How does blockchain work?

Blockchain technology allows us to trust strangers and enforce and establish a contract with them so that the system becomes more trustworthy and efficient. As each transaction occurs – and the parties agree to its details – it's encoded into a block of digital data and uniquely signed or identified. Each block is connected to the one before and after it — creating an irreversible, immutable chain. Blocks are chained together, preventing any block from being altered or a block being inserted between two existing blocks. Each block contains the reference of previous block and this reference is in terms of a mathematical problem that needs to be solved in order to spread the following block to the network. So it's extremely hard to pre-compute a series of blocks due to the high number of random guesses needed to solve a block and place it on the blockchain.

ILLUSTRATION



Source: <https://www.quora.com/in/How-does-Bitcoin-Blockchain-work-and-what-are-the-rules-behind-it>

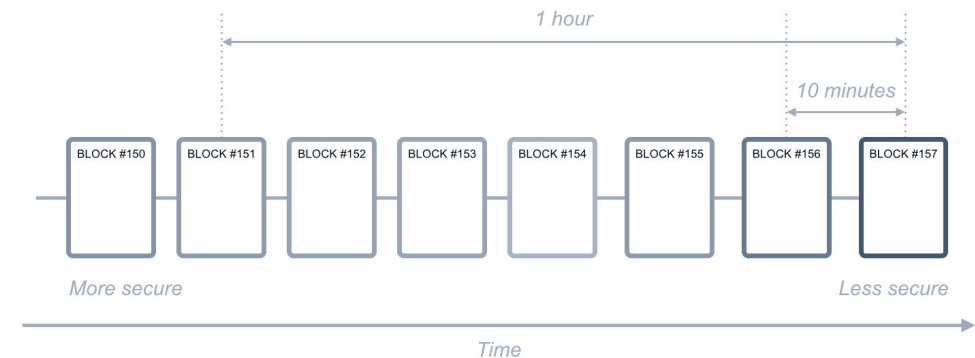


Fig 2: Blockchain transactions security

Blockchain in terms of user experience

As a developer or a designer of blockchain one needs to understand what blockchain is and how does it function and what are its components in order to design the components of the blockchain system for better utilisation of this disruptive technology. Meanwhile it is highly important that as a user one should be able to relate with the applications built on blockchain platforms as blockchain applications. Hence, it becomes of crucial and high importance to provide the experience of blockchain through UX of the application. Although blockchain is already enhancing the backend experience, it would be justified if it did it from the front end itself to make the experience better. It is important that we expose contents and processes which are relevant to the user and provide them with frequent feedbacks.

The design should make the platform feel more transparent, which would in-turn increase the users trust on the platform and help get users do more transactions without second thoughts. This will also improve relations between peers participating in the blockchain network and will help in substantial scaling of the system. Since this is a disruptive technology we are working upon, it is important that we work closely with developers and involve them in brainstorming sessions and in extensive discussions in order to reflect the back end process in the front end as well.

All this to use design to show the users that this is not any other application but a blockchain based platform and it has its own benefits and is trustworthy and advantageous over other non- blockchain application.

Designing for complexity doesn't mean make things simple. Make the tasks easier but don't take away their control.

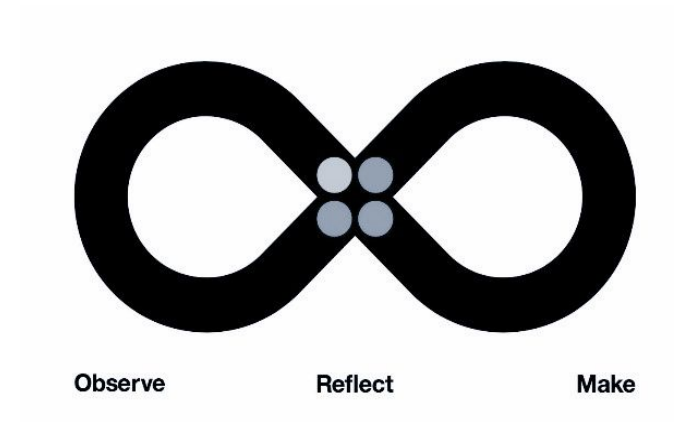
— [Dante Guintu](#), UI Designer

3

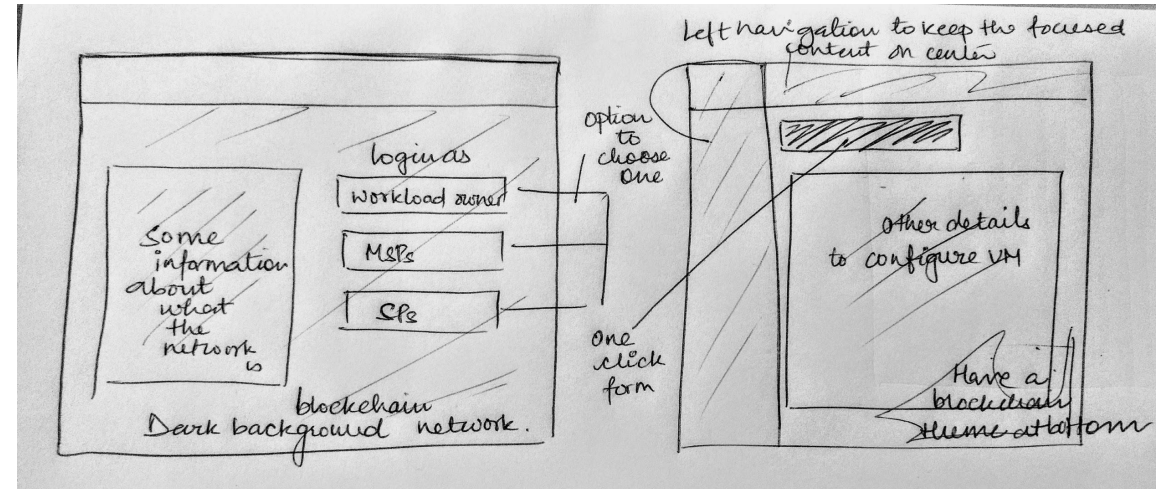
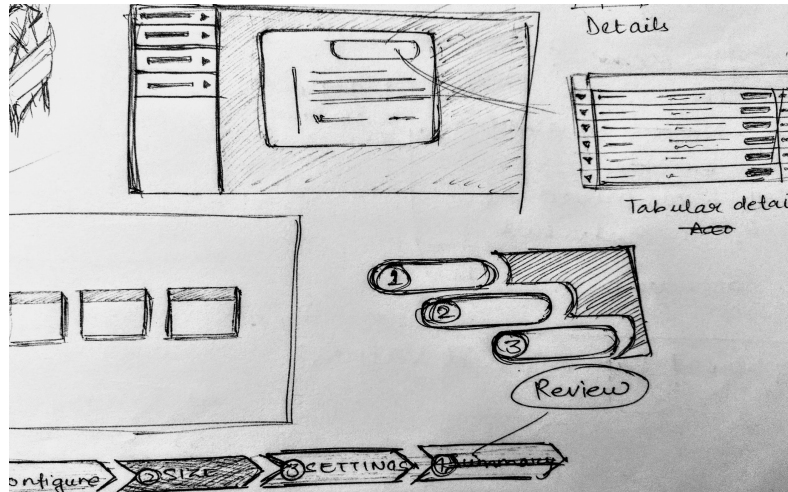
IBM design Thinking



Fig 3: Hills as statements of intent, written as meaningful user outcomes, playbacks to keep team aligned throughout the project.



Make (Prototype)



Continuous Improvement



It is important to make sense of the problem and facilitate group team alignment. Enterprise design thinking suggests 5 best practice to achieve the same. Remember everyone has a voice and all the voices need to be heard. It is important to keep people on track, monitoring them and getting status from the team as well, It is important to get sense of the room as to how many people are aligned with the idea, how many are encouraged or discouraged and vote on the top ideas using dots or just tick marks.

All this can still lead to 3 tricky situations but design thinking has cure for them as shown in the table below :-

	Analysis Paralysis	Group Think	Detachment
Problem	So much data is there to analyse that there is no conclusion	Everyone agrees to avoid conflict	Someone disagrees
Cure	Take a break and make something	Blind voting, where people are comfortable with their honest opinion	Understand what is at stake for them

Carbon Design System

It is extensively used by IBM design team as it has files which contain core visual components which are in line with company's branding and also helpful in maintaining consistency. The system provides necessary files required for developing the webpage of existing components.



Getting Started

Onboarding for designers and developers who are using Carbon for the first time.



Style

Guidance on usage and application for basic design elements.



Components

A library of all Carbon components, comprised of code, usage and style guidelines.



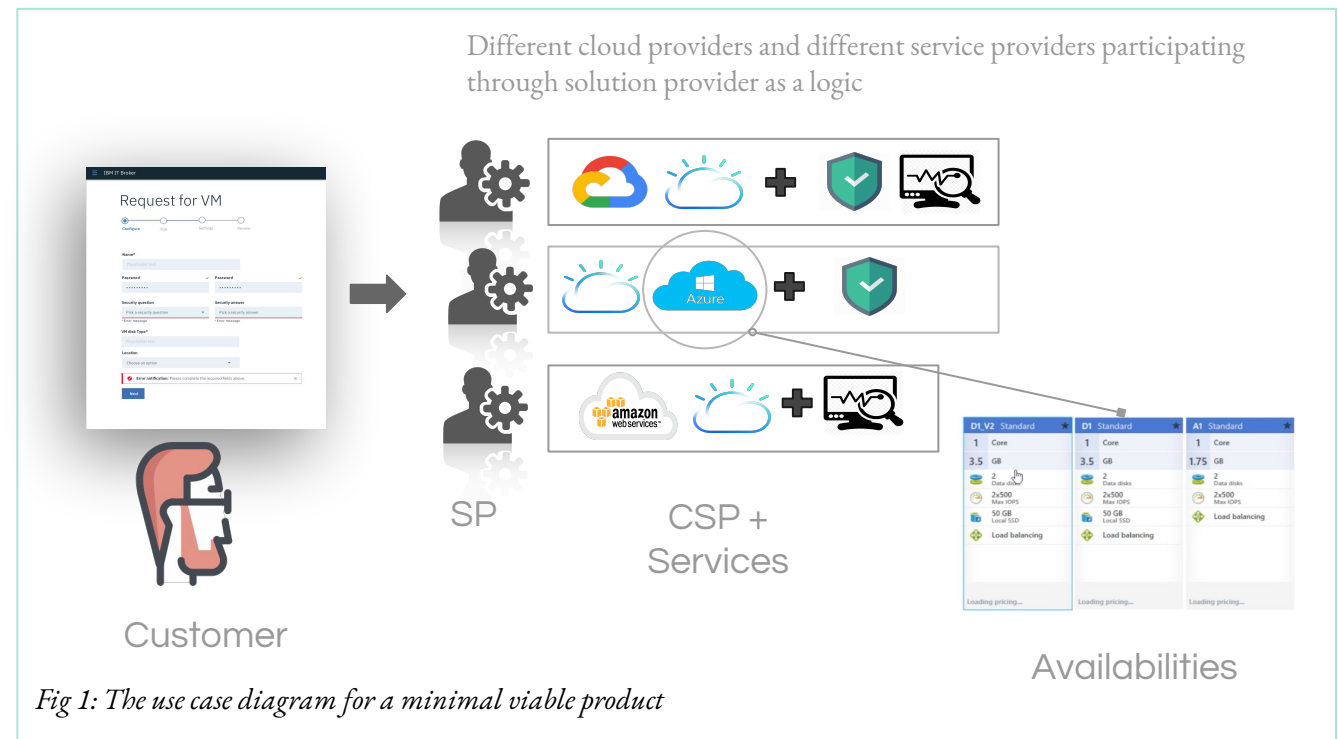
Resources

A helpful list of tools, links and downloads that will improve a Carbon user's workflow.

User Scenario

A workload owner is looking for infrastructure and services for his current IT requirements. However, he/she is unaware of the benefits of different cloud providers. He wants to be able to compare between different availabilities. Our broker solution can help manage and optimise the cloud cost and also orchestrate and govern cloud workloads. With this solution we can also let the customer know the cost incurring with the different solution and provide a estimated bill of IT. The solution then becomes a platform to transform your IT environment.

Solution involves four different personas which come together and involve in transitions between each other which is triggered by a series of chain codes. The first step of which is to bifurcate and partition the customer request into parts and send the appropriate part to the appropriate solution provider. As soon as the request reaches a solution provider the chain code starts and a suitable machine from a suitable cloud provider is provisioned which is then notified to the customer. Any additional services identified or requested will have gone to managed service providers and then they can start the billing of services as soon as the provisioning starts.



IBM Peer2Peer

Product Description

IBM GTS LABS

The request of a workload owner gets partitioned into multiple request by the logic that is written outside the blockchain network. To the network, each bifurcated request comes as an individual request to a capable solution provider. The provisioning of cloud and adding of services on the provisioned machine takes place in the blockchain network itself such that the transparency and the trust build by smart contracts is maintained and the bidding is fair and judged by the system. Usually different solution providers or managed service providers will have different roles in the system such as network provider, application providers etc.

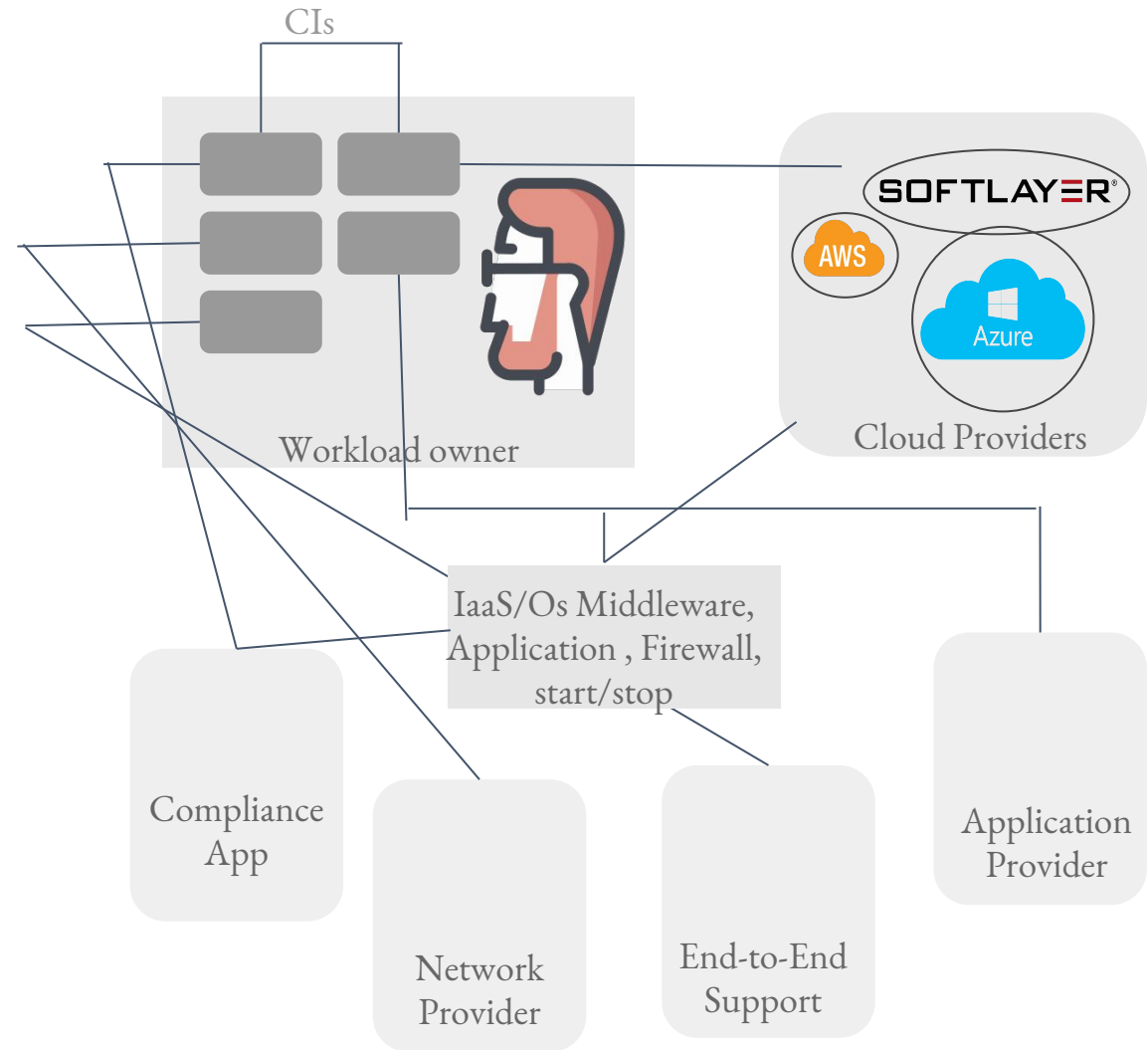


Fig 1: End to end solution for the peer2peer network

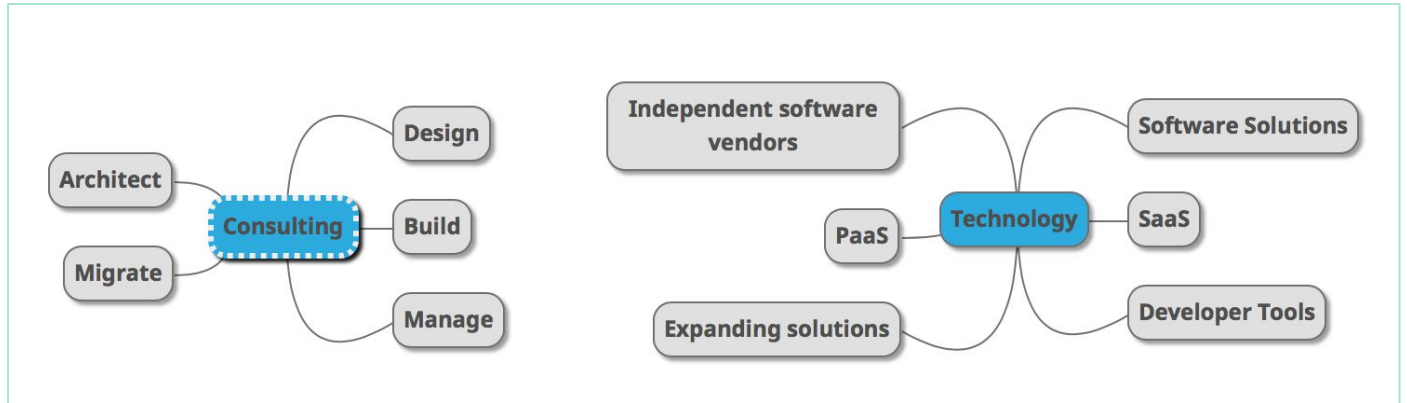
Information flow

Participants	Assets	Transactions	Events
1. Customers 2. Cloud Providers 3. MSP 4. Broker	1. Order 2. VM 3. AWS_catalogus 4. SoftLayer_catalogus	1. PlaceOrder 2. UpdateOrderStatus 3. SelectCSP	1. PlaceOrderEvent 2. UpdateOrderEvent 3. SelectCSPEvent

In order to define where the request comes and go and what are the events that are triggering inside a blockchain based application. We associated each of these in terminologies of the blockchain network. Hyperledger by IBM is one such platform by IBM where users are provided with an interface where they can build upon their applications. The files existing in the system are the database model files, permission files and the script file to write the logic. In model file we define our participants, assests, transactions and events which are triggering the chain code. Four participants were identified which will be responsible for provisioning, updating and viewing the VM, order and Catalogues respectively. Business network design identifies three transactions that our solution focused upon and three events as shown in the diagram above.

3

MIND Maps



Before proceeding with the solutioning, we used mind maps to identify the points we wanted our mind maps to reflect. It is divided into roles and offers of service providers and the domain they cover with their services and solutions. It has helped us organise the information visually and give a clearer view of the relationships that holds amongst each other. This graphical representation identified words which our solution reflects with focus on technology as software solutions, consulting as manage, roles of integration and customization while offering provisioning of machines with negotiations and constant monitoring. We decided to focus on these points identified to simplify the solution and make it more focused.

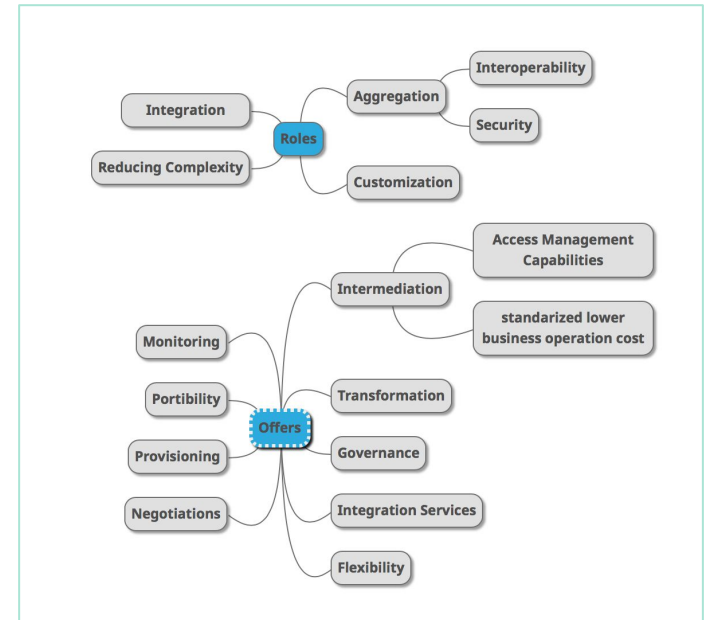


Fig 1: Mind maps for the roles, offers and domains of a service provider

Site Map

A site map is a model of a website's content designed to help both users and search engines navigate the site. It helped in planning for the actual development of the components of the site and how the information is going to flow from one web page to the another. Since the solution catered to different roles. Each page will be different for different roles and also will be catering to the different needs. For example, the priority for the customer will be to be able to request for a solution / service and view his existing service or the status of the requested service/ solution. whereas for a service provider there will not be an actionable item, however it would be important for him to have a dashboard where he can see the requests coming and fulfilled by him. The same rule will be followed for solution provider as well. As the provisioning of cloud is happening outside the blockchain network and through multiple service provider, it wasn't needed to have a role as cloud provider who are anyway capable to tracking their assets.

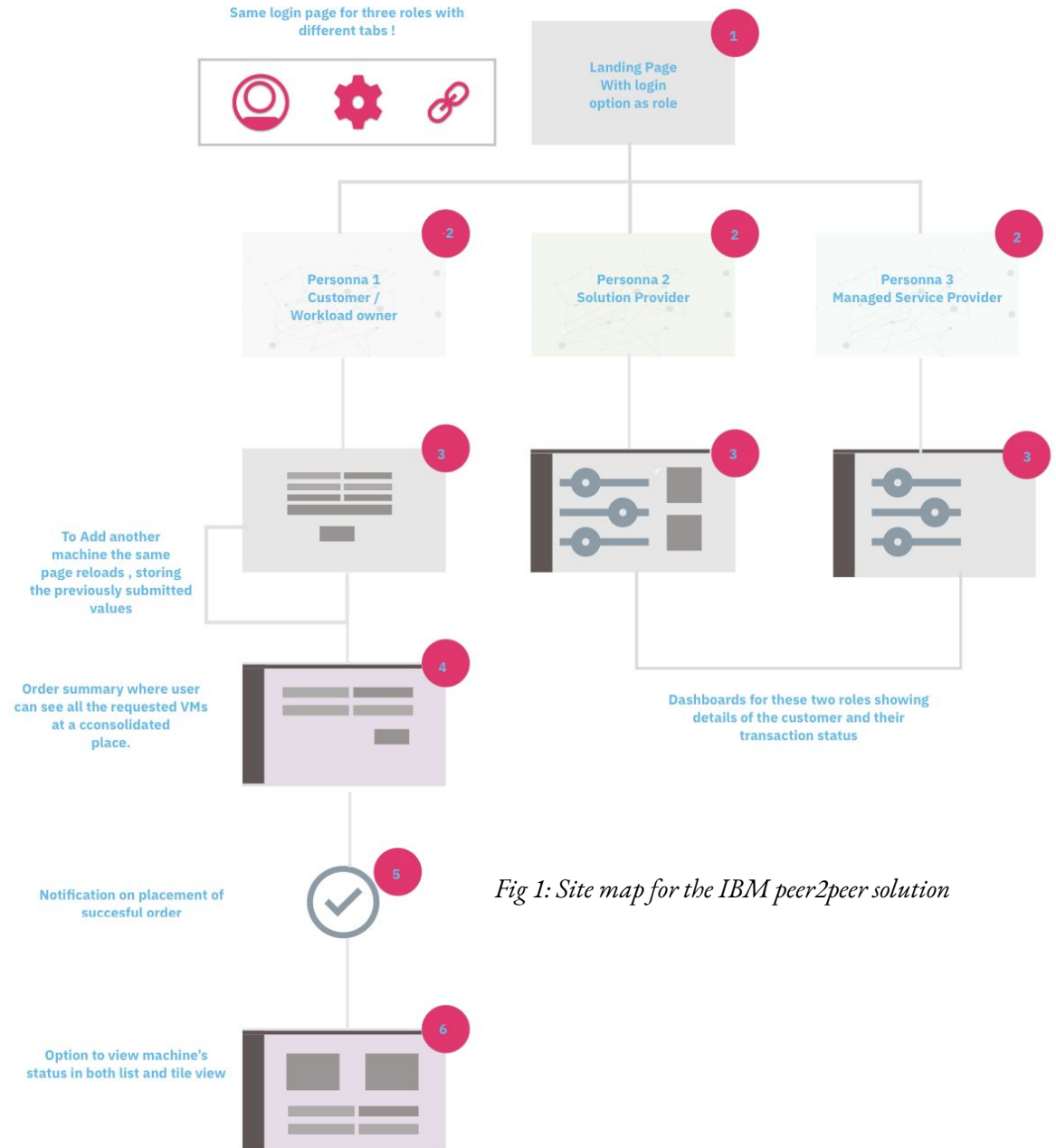


Fig 1: Site map for the IBM peer2peer solution

Log in as a

 Customer

 Solution Provider

 Managed Service Provider

Welcome to IBM Peer2Peer

Some Tagline Will
go here

LOGIN

Don't have an account ? [Create new account !](#)

Username

Company Name

Password

Submit

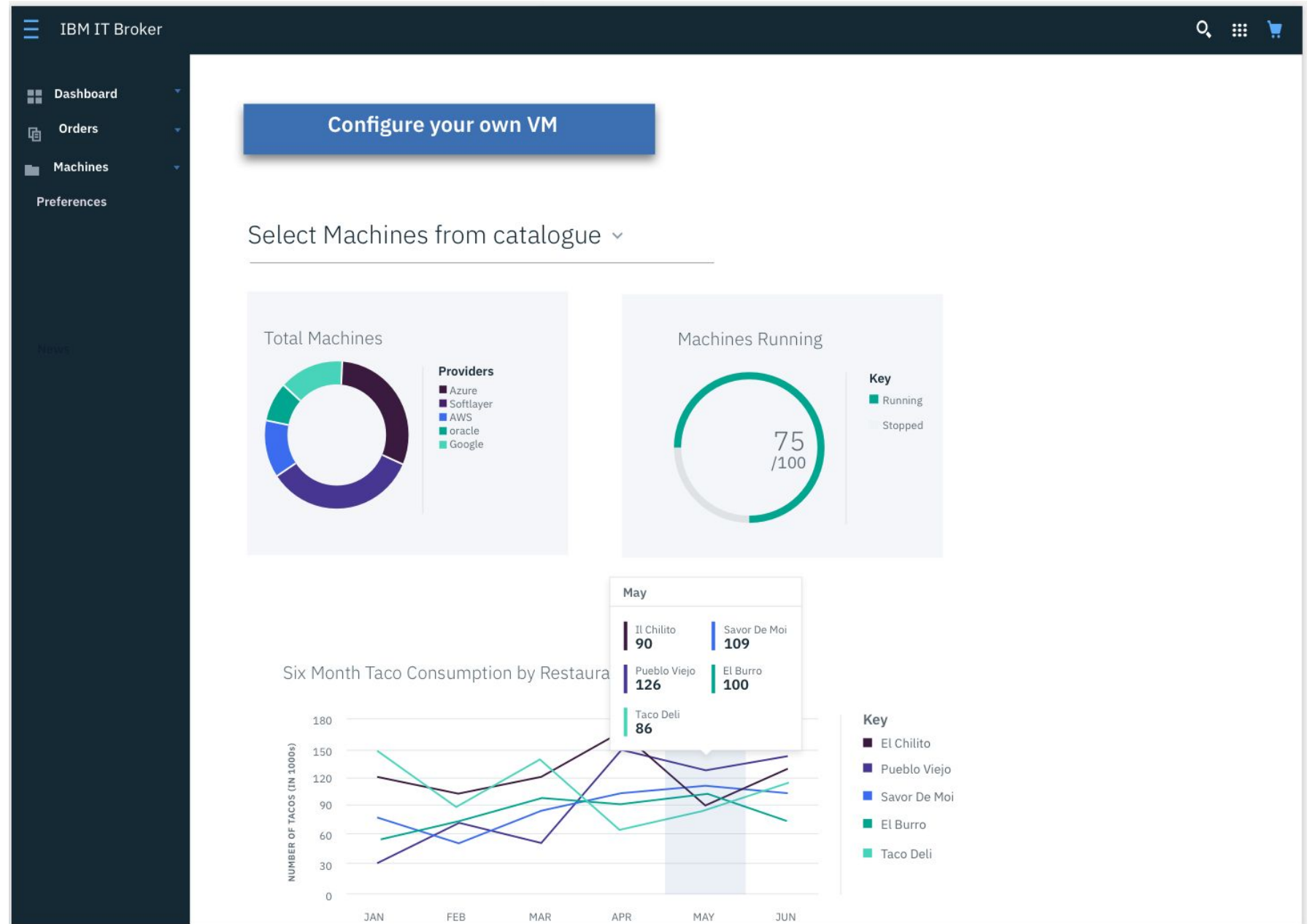
Informative Title

In the spirit of founder Mike Rypka's
original menu, we encourage
experimentation!

[Know more >](#)

As the screens should reflect that the application is a block chain application as per the user experience and also in terms of direct peer to peer communication and transactions the log in screen was made to reflect that using connecting blocks.

The current scope dealt with transactions occurring from the side of the workload owner who requires certain machines and solutions for his IT. The main task in this screen is to be able to locate the button to configure multiple VMS and see the statuses and healths of the machines provisioned.



In case the user is complete novice and is looking for a quick solution then they can select the machines from the list of machines available which are configured for basic requirements and can be modified as per wishes and the count can also be increased.

IBM IT Broker

Dashboard

Orders

Machines

Preferences

Configure your own VM

Select Machines from catalogue ^

D1 Standard

1 Core
3.5 GB
2 Data Discs
2 X 500 Max IOPS
50 GB Local SSD
Load Balancing

- 1 +

D1_GS1 Standard

1 Core
3.5 GB
2 Data Discs
2 X 500 Max IOPS
50 GB Local SSD
Load Balancing

- 1 +

A1 Standard

1 Core
3.5 GB
2 Data Discs
2 X 500 Max IOPS
Load Balancing

- 1 +

Total Machines

Azure

Softlayer

AWS

oracle

Google

Machines Running

75/100

Running

Stopped

May

Il Chilito

Savor De Moi

IBM IT Broker

Request for VM

Configure

Size

Settings

Name*

Placeholder text

Password

.....

Security question

Pick a security question

* Error message

VM disk Type*

Placeholder text

Location

Choose an option

Error notification: Please complete the required fields above.

Next

IBM IT Broker

Request for VM

Configure

Size

Settings

Review

Core

Option two

Option three

Option four

(RAM)

0

GB

Data Discs

0

VM disk Type*

Placeholder text

Memory

Choose an option

Preference

Choose an option

Error notification: Please complete the required fields above.

Back

Next

IBM IT Broker

Request for VM

Configure

Size

Settings

Review

Payment

Credit card number

000-000-000-000

Security code

820

Expiration

10/2019

Error in form: Please fill out the required fields.

Back

Add Another

Review Items

The details for the requirements is captured in four progressions in order to provide more control to the user and to get error free input from the user. The screens vary from configuration to size to the payment option which in turns leads to order summary screen.

In order summary, the user can go back and add more VMs with different configurations and can also view the estimated bill of the IT including the services involved.

IBM IT Broker

Dashboard

Orders

Machines

Preferences

Order Summary

Add VMs

Name	CPU	Memory	Disc	Services
Machine 1	1 x	1TB	None	☒ Queso ☐ Guacamole ☒ Chips
Machine 2	1 x	1TB	Spicy	☐ Queso ☒ Guacamole ☐ Chips
Machine 3	2 x	2TB	Pico	☐ Queso ☐ Guacamole ☐ Chips

VM count

3

Total cost

\$57.61

Submit Order

✓ Your Request for machines has been submitted succesfully. [View machines.](#)

Back

On clicking view machines , all the provisioned machines will be listed down with their monitored status in terms of percentage. Here the user can also take actions on the machine like a normal dashboard of machines available. The view can also be obtained from the left navigation bar.

IBM IT Broker

Dashboard

Orders

Machines

Preferences

Your Machines

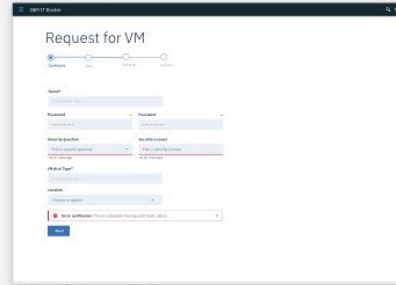
Name	Host/IP	Health Percentage	Status
Load balancer 1	HTTP	75% CPU 25% Memory 25% Disc	Active
Load balancer 2	HTTP	75% CPU 25% Memory 25% Disc	Active
Load balancer 3	HTTP	75% CPU 25% Memory 25% Disc	Active
Load balancer 4	HTTP		Active
Load balancer 5	HTTP		Active
Load balancer 6	HTTP	75% CPU 25% Memory 25% Disc	Active
Load balancer 7	HTTP		Active
Load balancer 8	HTTP		Active
Load balancer 9	HTTP	75% CPU 25% Memory 25% Disc	Active
Load balancer 10	HTTP		Active

To make the screens , sketch app was used. Where the components from carbon design were implemented and colour scheme as per IBM was followed. The font used in the screen is IBM plex.

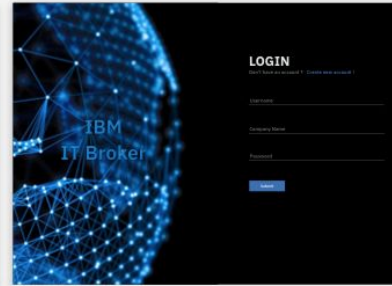
The screens were further prototyped using indigo Invision which helped create a clickable prototype of the whole system. Upon approval these files were replicated in HTML / CSS code using craft plug in which converted the elements into CSS by specifying the properties of the elements.

This application lies outside the block chain network.

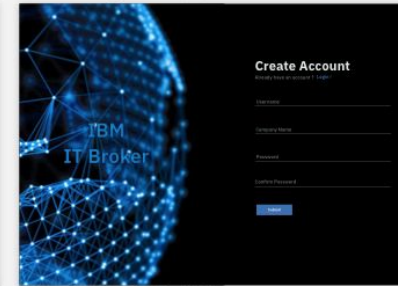
Desktop



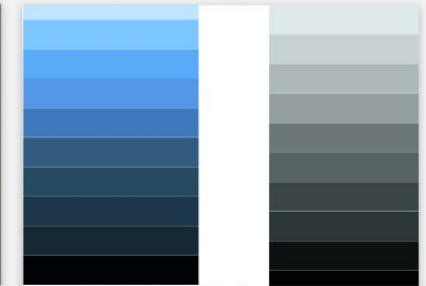
Desktop HD



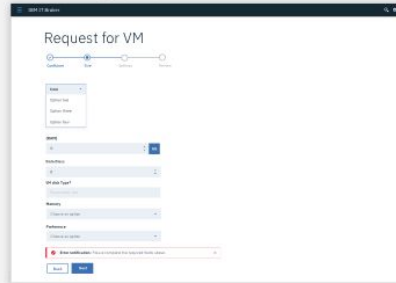
Desktop HD (1)



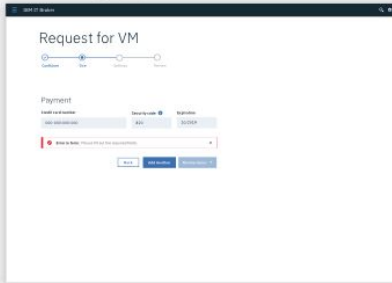
Desktop HD Copy



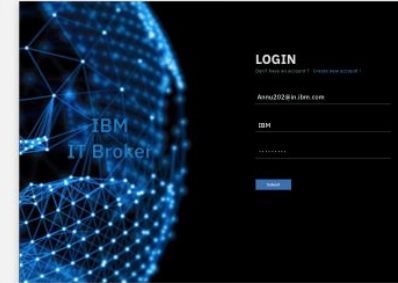
Desktop (2)



Desktop (1)



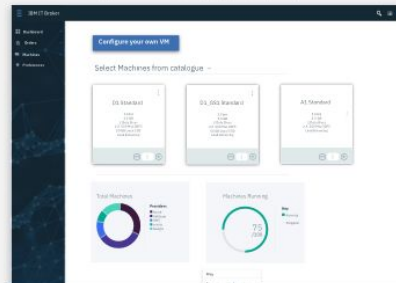
Desktop HD (2)



Landing Page_Roles



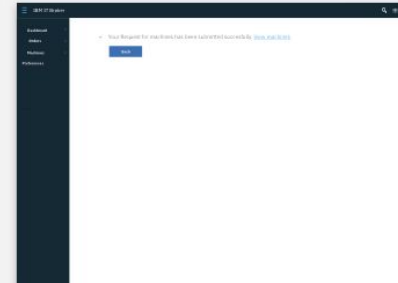
Desktop HD Copy 3 (2)



Desktop HD Copy 2



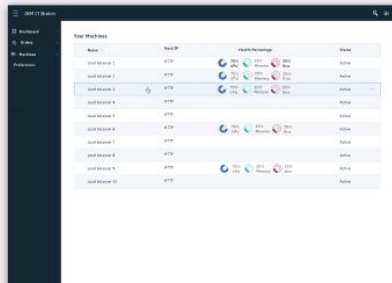
Desktop HD Copy 4



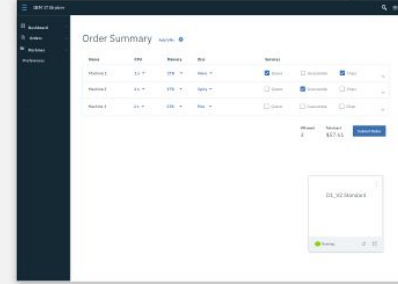
Landing Page



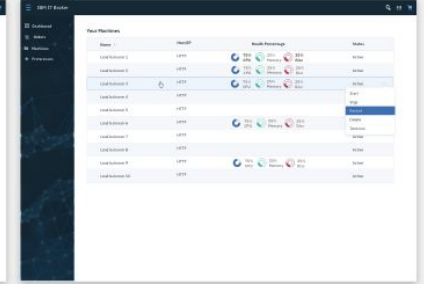
Desktop HD Copy 3



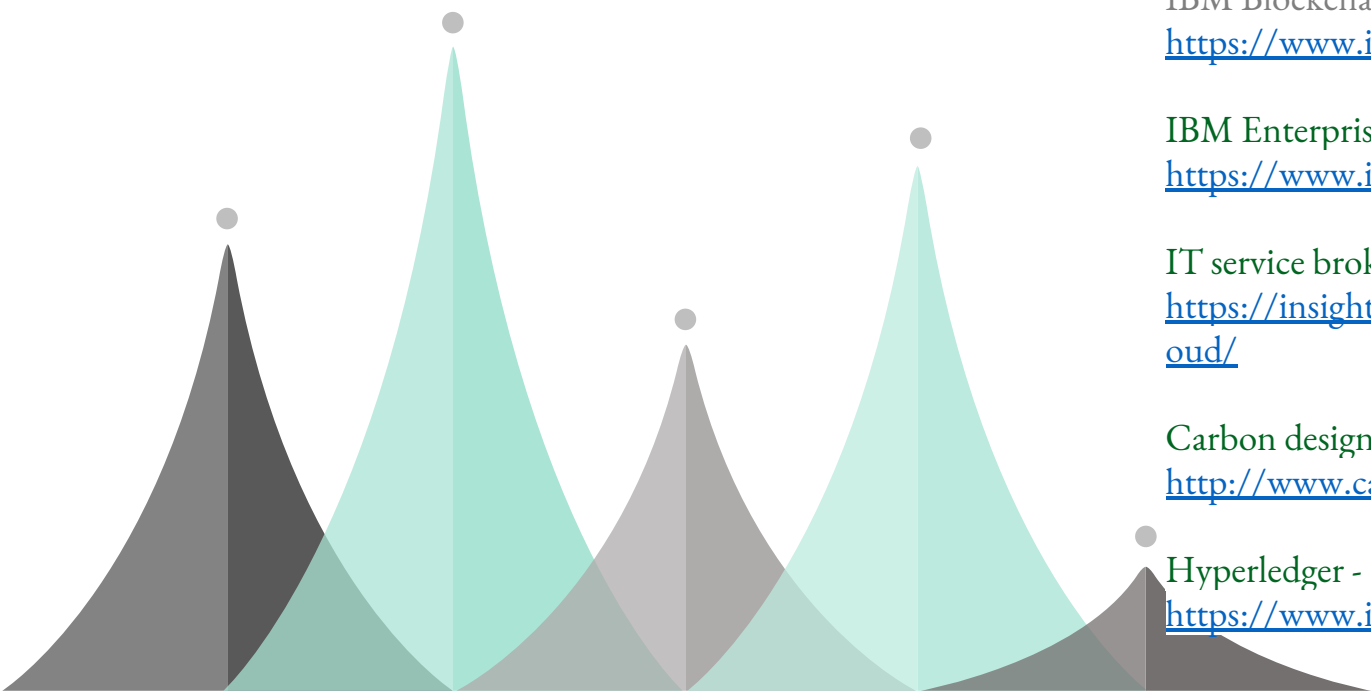
Desktop HD Copy 3 (1)



Desktop HD Copy 3 (2)



Thank You

A decorative graphic at the bottom of the slide consisting of five overlapping triangles of varying heights and widths. The triangles are colored in shades of teal, grey, and dark grey. Each triangle has a small grey dot at its apex.

References

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