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BACKGROUND (Prior Art)

Information technology has evolved tremendously within a short period of time in the last century. Processing and exchanging information in a digital domain is much more productive. Internet access is now easily within the reach to everyone. The internet has grow tremendously and is easily within the reach to everyone.

The world surrounding us is very much physical oriented. Interacting with physical objects is something inevitable in our daily live. Information interaction in the physical domain is unlike the digital domain, which is very much slower and prone to error. These will eventually result to a higher cost.

We are constantly striving towards a better productivity, reducing time, improving quality, and minimising cost. A lot of time, we are repeatedly wasting our time doing task that has been done. Why should you spend the time to scan your business card, digitising it, when it was already a digital format in the first place? Why should you spend the time to search or take the product's photo shot for your business marketing purpose, when someone, who is willing to share, might have already done so?

There is no generic system available which allow us to tap into the same work done by another person across the globe. The closest system is the internet that we have today. The World-Wide-Web allows the sharing of any form of informations through the internet, but information searching is becoming more and more tedious with the amount of information posted over the decade[1][2].

Considering the economic as a whole, with the rising human capital cost, these inefficiency can have a significant impact to businesses. The following 3 examples address the issues that we may have, when dealing with physical objects.

- Relating information to physical object
- Lost of information during the distribution process
- Information sharing through the supply chain

Relating information to physical object

Example 1: One simple example to illustrate can be a TV (television) that we have in our home. The TV usually comes with a user manual booklet. The manual contains information about the TV. It is usually stored away in a cabinet, together with the user manuals from other appliances. It takes time to search for the manual when information is needed. If the manual is misplaced or lost, it can be frustrating looking for the manual. The following illustrates some Prior Art 1 to 6, solutions that are commonly implemented in our era.

(Prior Art 1) In this information age era, we can now easily obtained a digital copy of the user manual through the internet. A user can simply access the internet, visit the product website and download the manual. It is an improvement over the physical access to a user manual booklet. The improvements comprising of the followings,

- Search has become simpler by typing the correct keyword, allowing an internet search engine to do the searching for you, instead of the hassle of doing physical search.
- Digital copy of the user manual is now available through the internet cloud. This save physical space and users do not need to manage any space for storage.
- Paperless, environment friendly and no material cost.
- User manual that are downloaded can be up to date.

These are a great leap of improvement, but the solution have its own sets of problems,

- A user is assumed to have a basic knowledge in internet/computer technology in order to do an information search. For a non IT (information technology) savvy group of users, it can be difficult or time consuming for them to perform a search for a specific information that they are looking for. The multiple search results (relevant or irrelevant) can be overwhelming to a user.
- The internet can be like a public information junk yard. Duplicated copies and various version of the user manual can be found from many alternative websites. There is less sense of version control and ownership accountability. The duplicated copies takes up digital storage space.

- All websites are designed differently. The websites have some basic similarities in their function, but in general, they have a different presentation style. The layout, naming convention and UI (User Interface) can be different. A well designed website will be easier for a user to navigate, while others may take up more time for the user to be familiarised with the site before they can managed to find the information. All websites are designed differently, and this can be overwhelming to a user.

A significant amount of time is required to retrieve the related information of the TV, which is a physical object. The physical object can be very near to the user but the information may not.

(Prior Art 2) RFID (Radio-Frequency IDentification) technologies is widely being used in the area of inventory tracking and payment transaction. The keyword "RFID tracking" in the google patent search engine on 30 Sep 2012 yield about 62,900 results. WIPO website returns 547 relating patents.

RFID is widely used in the area of inventory tracking and payment application. It has limited advantages, limiting the growth in RFID technology. There isn't much incentive for the industrial to adopt RFID compared to other technologies like bar-code, or magnetic strip, or smart card due to cost and security. No matter how cheap a RFID is going to be, it will never be cheaper than a bar code which consist of mainly paper and ink. No matter how secure the RFID is going to be, it will not be as secure as a contact smart card.

As a tracking solution, RFID offers wireless detection which can be very attractive. Human error can be reduced, because a user will no longer need to consciously performs scanning work in order to track an object. The deployment of such an automated detection system can be complex and expensive. As such, it is implemented mainly in a logistic warehouse for standard items like a pallet, crates or other gigantic parts. Tracking of daily items like a user manual will not be practical using RFID. A number of invention has been generated as a tracking system to track down physical objects, but it is not widely adopted. [5][6][7][8][9]

RFID is being utilised like a bar code or smart card; which does not bring out its true uniqueness and value.

We are interacting with physical objects in our daily live. Physical objects will always have information (non tangible components) associated with it. There is a relationship between the physical object and its information. They should be treated as the same single entity.

Lost of information during the distribution process

Example 2: Business card

Business card provides us a convenient means to obtain information about a company or individual. It is also a form of advertising from the perspective of a business.

More and more businesses are interacting faster with one another with today's technologies. We have gradually collected a stack of business cards. The cards were manageable until we have realised that it took us longer and longer time to search for a card.

We are now living in the information age, where there are many alternative means of keeping contact other than using the traditional business card. The fact that the card is still widely adopted today in this information technology age shows that the businesses still find it more convenient to exchange tangible physical business cards. It is still the simplest mode of exchanging contact, suitable in most occasion.

(Prior Art 3) Solutions have been created to help people managed business cards. We have a business card scanner to convert the physical card to a digital file. Information associated with the business card had to be manually key in after each scan; OCR (Optical character recognition) program provides an additional means to help user to convert the printed text into digital data automatically, allowing the information to be searchable in the future. Software is also available to help us manage the scanned card and information.

Improvement over physical business card:

- A scanned copy of the business card is now digitally available for future search.
- User is able to save physical storage space, without the need to keep the physical cards.
- User is able to save time.

We can now search faster and work more efficient than before, but we have also created other new problems.

Problem:

- User have to spend time to scan the card.
- User have to manage and organise the scanned data, which can be over-whelming.
- Digital storage space is required for each of the business card scanned.
- OCR may fail to work especially the business card's design is too fanciful; user will then have to key in the information manually.

A lot of time and effort is still needed to maintain an efficient business card search system. Each business card that is received requires time and effort to maintain. If the same card are distributed to more people, the burden will be multiplied. The duplicated effort is a lost in productivity, which is significant. Unnecessary time and effort are wasted.

Information are often lost in the process of distributing physical objects. A business card started off from an art work; which is the origin of information and is digital in nature. The printing process has translated the digital source of information onto a physical business card, which is analogue in nature. The scanning solution allows the user to convert their analogue card back to digital, allowing them to carry out their work with a better efficiency. The multiple re-conversion process is not productive and is unnecessary. They may also introduce errors which are a waste of time and effort. In many other examples, information relating to physical objects are not preserved and are lost in the process of distribution.

The use of information that is on a business card requires additional effort as well. When a user needs to use the information on the card, the user will need to manually key in the information, transferring the information from the card to another device. This is another form of analogue to digital information conversion process. Examples are,

- Keying in the numbers into their telephone to make a phone call.
- Keying in URL into a web browser.
- Keying in a destination into a GPS (Global Positioning System) device on their vehicle.

Manual transfer of information can be inefficient, especially when this process is repeated frequently.

(Prior Art 4) There are also alternative solutions which can simplify the problems mentioned earlier. We have fast-dial, bookmarks, auto-text-complete, etc... These solutions have its practical limitation. Managing the fast dial or bookmarks can be a problem itself.

(Prior Art 5) The use of NFC [10], QR code [11], Imaging [12] for business card has a bigger improvement over the previous prior art. It is still relatively new in the implementation. A NFC business card, allows digital business information, to be stored as well as be printed on a RFID card. This innovation has help the user to extract the information accurately and fast. You can instantly extract the information on the card and store it to your collection. The card can make instant phone call or allows immediate access to a website.

The use of NFC for business card application is more productive, because the manual data entry was done only once at the initial design stage. The digital information is preserve in the RFID card itself. This allows accurate and instant retrieval of the information when needed. The one time data entry effort that was done has benefited the many other users in the future. NFC improves the process by preserving the business information on the card itself.

The use of NFC shows great leap in improvement; however there are still another extent where information can be lost. The information stored in a NFC business card does not contains the aesthetic design of the card because RFID has limited storage capacity. The artwork design itself can be important as it also contains information about the business (Trademark, professionalism, and other goodwills...). If the personnel who distribute the name-card has left the company, the information contains on the card can becomes invalid, which might result in time wasted to establish back the contact, or an annual attempt to seek for updates of the contact information. This problem will also apply if the company changes her contact details like address, website, or even worst still, the company name. The contact link between the customer and business can be lost. Information can still be lost in the process.

Business card is one of the many examples that relates information lost in the process of distribution. Other examples can be, business information like quotation/invoices, technical information like design CAD files, source code, user manual, etc...

Information relating to physical objects can be lost during the process of distribution. Official information can also be changed over time. This is another information problem relating to an object.

Information sharing through the supply chain

Example 3: Supply Chain Information System Architecture

It is quite clear the importance and role of IT in the supply chain.

(Prior Art 6) There are many articles about the theory of the supply chain information system. With many buzz technical terms.

- Business process, SCM (Supply Chain Management)
- ERP (Enterprise resource planning)
- SAP (Systems Applications and Products)
- SOA (Service Oriented Architecture)
- OAIS (Open Archival Information System)

These systems share one thing in common, and that is to allow our work to be efficient through sharing of information. Many suggest a standard centralised controlled system. Such system is fairly complex, and system integration is often difficult and expensive due to proprietary implementation.

- System is highly customised.
- Expensive to implement.
- Difficult to integrate information between vendors.[13]
- System is difficult to build upon or add-on.
- Exchange of information is mainly utilized within the supply chain industry.

The industry focus a lot attention on the efficiency within the supply chain but have overlook the productivity and business opportunity out of the chain. The product itself is in fact spending more time outside the supply chain; an important factor to appreciate its real significant.

The concept IOT (Internet of things) was first used by Kevin Ashton in 1999 [15]. Many articles has been written, coming up with various ideas of what such system would be. Some says that it would be a world of M2M (machine to machine communication), some says that it is a network of intelligent sensors. There are also sceptics who think that such a vision is simply not possible, after years of discussion. IOT is complex and it is difficult to materialize the concept [16][17][18]. There is not yet a practical infrastructure to realise the vision.

Our generation has been enjoying the convenient that information technology (IT) has brought us. There is no doubt that the information technology have revolutionised our live, making our live easier and more productive compare to the industrial age when information travels much slower.

The evolution of IT has been moving at quite a fast pace with new technologies introduced over the decades, especially the Internet. The technologies have provided us with lots of information at an incredible speed, but this has evolved to a stage where it begins to hinder our efficiency. Searching the internet can be like searching a needle in your junk yard. With more and more information generated for the internet daily, the situation will get even worst.

The fact is that we are now, unknowingly becoming unproductive. Overwhelming ourselves with irrelevant informations that we can actually handle. We are facing information crisis that is affecting our time, money and quality of life.

All the three examples have a problem in common. They have illustrated a new problem that is unique to our information age era. Problem that has arises from the information era that we have created. We are facing information problems, affecting our time, cost and quality of life. There is an opportunity for improvement. We need a solution to solve information problems.

DRAWING (Figures)

Fig 1 flow diagram illustrates a simplified system architecture which allow information retrieval and maintain the integrity of the information that are related to an object.

Fig 2 further relates to Fig 1 as a possible example of implementation. It illustrates the system flow, by using a mobile phone as the Invoker 501, RFID tag as the ObjectTag 401, Television set as the object, and the internet cloud representing the servers network.

Fig 3 flow diagram illustrates a possible complex version of the system architecture which allow information retrieval and maintain the integrity of the information that are related to an object.

Fig 4 illustrate an example of the data attributes, representing the information that are related to an object.

DRAWING (Reference Numerals)

[401] "ObjectTag 401", a means of tagging to allow an object (physical or virtual) to be digitally identified.

[402] "RFID Tag 402", a 13.56MHz RFID tag

[499] "TV 499", a television set as the object for illustration.

[501] "Invoker 501", a computing device attached with a reader (or sensor) for ObjectTag 401, having access to the internet, and is capable of performing data process task.

[502] "Mobile Phone 502" with built-in RFID reader.

[699] "Information Cloud 699", a chain of servers containing informations related to the object.

[608] "Server08 608", server set up by entity "E8"

[607] "Server07 607", server set up by entity "E7"

[606] "Server06 606", server set up by entity "E6"

[605] "Server05 605", server set up by entity "E5"

[604] "Server04 604", server set up by entity "E4"

[603] "Server03 603", server set up by entity "E3"

[602] "Server02 602", server set up by entity "E2"

[601] "Server01 601", server set up by entity "E1"

[701] "InvokerRead", requesting for identity information from the ObjectTag 401

[801] "ObjectTagResponse", identity information acquired from the ObjectTag 401.

[711]-[799] Query (web-service, remote function call) to another server; sending data in XML format.

[811]-[899] Response return result from the web-service; receiving data in XML format.

DETAILED DESCRIPTION

The application is a system which model a physical object in our real physical world by linking any form of digital information that are related to the object. It facilitates the object to cumulate or retrieve any form of related digital information. This allows the object's information to be retrieved or searched instantly within a confined context in a digital domain.

The object's ability to preserve the origin of information facilitates growth. New information can be progressively added, moulding itself into an unique identity. The object and its information can be regarded as a single object entity.

Linking of information is done in the process of distributing the object. The process establish a chain of responsibility where the subsequent owners taking over the ownership of the object will have more authority over the earlier owner. This models also reflects how a distribution chain operates in a business world. An inheritance structure ensure that individual information provider/server can work on their interest while providing information that were related to the object. The low coupling between each server, makes it easier to integrate, cumulating the infinite possibility of information/knowledge that can be related to the object.

Having a quick access to knowledge or information directly from the object allows a user or system to achieve tasks in a much shorter amount of time, which leads to better efficiency and productivity.

Bridging the Physical to the Digital

Fig 1 illustrate a simplified generic architecture. Fig 2 illustrates a practical implementation which helps to interpret the generic architecture in Fig 1. For illustration purpose, the subject of the object is a television TV 499 as shown in Fig 2.

The TV 499 being the said object, is affix (or built-in) with a RFID Tag 402. The RFID Tag 402 is a ObjectTag 401 (in Fig 1) representing the said object TV 499. An ObjectTag 401 allows an object to be identified in a digital domain.

Many physical objects do not have the ability to identify or communicate in the digital domain by themselves. An example could be a plain ceramic cup or an ordinary piece of stone. It is a non-living thing and do not have any intelligent to communication. This is unlike a computer

device or a living being which can interact in the digital domain. The ObjectTag 401 becomes a means for the non-intelligent physical object to be identified in the digital domain, therefore opening a channel for intelligent interaction. It is perceived as the gateway to the soul of the object. This system allows human or computer to communicate with almost any ordinary object.

This RFID Tag 402 contains 2 informations, comprising of an ID (string of data) and an URL (uniform resource locator).

The URL stored in the RFID Tag 402 contains the network address of a server where the information that are related to the represented object can be acquired. It is the only server known to the ObjectTag 401 where the object's information can be found. This is defined as the object's immediate server which is referring to Server08 608 in Fig 1. The object's URL provides a link to its source of information.

The ID is a single or combination string of data that is used to differentiate between various objects within the URL domain. The ID together with the URL can uniquely identify a particular object. The ID of two objects is allowed to be the same; it means that the objects contain the same information since their URL and ID are the same.

Cloud Formation

The Information Cloud 699 in Fig 2 represents the network where the information of the TV 499 object can be found. It is made up of a chain of servers which the architecture can be as simple as those in Fig 1, or it can be as complex as those in Fig 3.

The formation of the Information Cloud 699 will depend on how the object was distributed in a supply chain. There is no definite structure, or a limit in the number of servers in theory. The Information Cloud 699 is naturally formed during the distribution process, cumulating the object's information progressively.

Each server that resides in the Information Cloud 699 represents an individual entity who has interest in providing and maintaining her own information that are related to the object. These are illustrated by the servers from Server01 601 to Server08 608 in Fig 1 or Fig 3. The entity may refer to a corporation, a department, a team, or a person.

The server is a generic information system; it can be a physical server that is set up by the entity or a virtual/cloud server which is provided by an information technology service provider.

Server Chain in the Cloud

The formation of the Information Cloud 699 builds up in a progressive manner. The following example illustrate a process of cumulating the TV 499 product information through a supply chain distribution; starting from a circuit manufacturer, to a television manufacturer, to a retailer and lastly, an organisation or user holding the asset.

Server01 601 can represent the circuit manufacturer for a circuit board component of the said TV 499 object. It is at the bottom of the chain, and belongs to the first entity E1 who introduce the ObjectTag 401 (which is the RFID Tag 402).

E1 is sharing information base on the value-add that she puts into her product. The product informations that are maintained by Server01 601 could be as follows (for example),

- circuit serial
- model no
- schematic
- website, and etc...

These are informations that are commonly exchanged between E1 and its vendors. It will make sense to digitise and make the information easily available. For example, the schematic of her production is made available for her vendor. This creates a single instance of information which will be maintained by E1 who has a direct interest over the information. Any new information or updates will be manage directly by E1

The informations are store in each server as a Key and Value pair. as illustrated in Fig 4. The Key corresponds to the attributes of the object; attribute for examples "colour", "size", "material", "cost", etc... . The Value corresponds to the data of the attribute; for examples "green", "10 x 20 x 35mm", "plastic", "\$5", etc... .

In order to relate these informations to the product, the RFID Tag 402 is attached to the product. The tag is written with an unique ID and an URL allocated. The URL will be the address of Server01 601. At this current stage, a user is able to retrieve the current informations of the object through web-service by sending queries together with the ID, to the server as indicated by the URL.

A next entity E6 can represent a TV manufacturer in the supply chain working on enclosure, and packaging for the product. The circuit board was linked to Server01 601, E6 is able to acquire the board's information directly through the RFID Tag 402. Informations like the schematic/dimension can be retrieve by E6 to perform her enclosure design for example. The information can be retrieved instantly from the URL pointed by the tag, and can be the most up to date version.

E6 being the TV manufacturer value-add new components/informations to the board, moulding the object further into a finished TV product. Server06 606 is set up by E6 providing the following finished product informations,

- enclosure design CAD file
- user manual
- software, driver
- product photo shots
- website, and etc...

E6 will share her information as what E1 has done. The approach will be slightly difference for the subsequent entity. The RFID Tag 402 that was affixed on the circuit board can be reuse. The RFID Tag 402 has rewritable memory which allows overwriting of data. The overwriting feature enable E6 to reuse the RFID Tag 402 for her own interest.

The new information can added to the object by over-writing the URL link of Server06 606 onto the RFID Tag 402. Before overwriting, the existing data on the ObjectTag 401 is read and saved onto Server06 606. This will ensure a link to the previous server, hence preserving the object's information. This approach do not required much memory on the ObjectTag 401; and is able to link to a large source of information. The full information relating to the current object is now available from Server01 601 and Server06 606. Information will always be up to date.

The information ID and URL of Server01 601 is now saved on Server06 606. The RFID Tag 402 is then overwritten with a new URL pointing to Server06 606. Overwrite of the ID is optional depending on the context of the product. Server01 601 now becomes the immediate server of Server06 606.

The process of saving the URL of the earlier server (Server01 601) is essentially preserving the information that the object has had. Server06 606 has inherit the information from Server01 601. Encapsulation is introduced between the servers. It will be up to the entity discretion to preserve the link or not.

At this stage, each server holds a portion of the information relating to the object. Together, the servers provide the complete information the object has. It is possible for each server to contain a same attribute. For example, both server may contain the same key "website". The key "website" may indicate the respective company website which has a different value. Each server will maintain the attributes that they have interest in providing. Each respective entity is responsible for their own information. This reduces redundancy and improve information efficiency, because each entity take care of their own information.

The ObjectTag 401 may have been over-written with new information from Server06 606, but the old information from Server01 601 can still be accessible after the inheritance process. E6 will just need to maintain the URL link to Server01 601 and do not have to maintain the information which may be irrelevant to her business.

The inheriting process continuous for Server07 607 which can be a retailer entity, who has the interest in maintaining the retail price, warranty and her website information relating to the object. For Server08 608 which can represent a user who maintain her own server to keep track of her assets, and maintain information like ownership, asset ID, location of the asset.

At any stage in the supply chain, the last server holding the ownership/responsibility is known as the object's immediate server. Immediate server is the first server that the object will access for any object's information. During the process of distribution, if object gets inherited by another entity, the immediate server of the object will changed as well.

The object evolved as it move through the distribution chain. More and more information are associated with the object. This cumulative process builds up the object's character, forming the Information Cloud 699, moulding itself into an unique soul of its own. The formed chain has also created a search boundary where information relating to the object can be found. The information becomes more relevant to the context, allowing the search for information to be easier and faster.

Invoker

The Mobile Phone 502 device in Fig 2 has a RFID reader built in, which allows it to read the corresponding RFID Tag 402. It is a Invoker 501 in Fig 1.

An Invoker 501 is an computing device containing a software program which is capable of detecting said ObjectTag 401 and query for information in the Information Cloud 699. The query's result will enable the Invoker 501 to perform a specific task. Invoker 501 can comes in a variety of embodiments. In Fig 2, the Invoker 501 is a smart Mobile Phone 502 with a RFID reader built in, capable of internet access and running software applications.

Invoker 501 has an appropriate reader/sensor which is capable of detecting an ObjectTag 401. A RFID tag will requires a corresponding RFID reader. A bar code, QR code label or magnetic stripe will requires its code reader/scanner. An visual image will requires a camera (image capturing sensor). A sound will requires a microphone. The reader or sensor can be attached as a separated device or built-in as an integrated device to become the Invoker 501.

The computing device can be in the form of a mobile phone, computer (desktop, laptop, notepad, tablet), a customised embedded device, or etc... . It is capable of acquiring data from a reader, doing computation, and request for data from the internet network.

The operation begins with a user or system wanting to retrieve a "User Manual" information of the object. The user will activate an application software on the Invoker 501. In this scenario, the user position the Mobile Phone 502 near to the object so that the RFID reader is able to scan the RFID Tag 402. This scanning action is intuitive and allows a simple way for the user to physically identify the object of interest. This is represented by the process [701]. The process [801] indicates the retrieval of the data (ID and URL) from the RFID Tag 402.

The Mobile Phone 502 manage to obtained the ID and URL from the RFID Tag 402. These set of data uniquely identify the object, which determine the location where the information of the object can be found. The Mobile Phone 502 will attempt to send a query Error: Reference source not found to the specific URL (immediate server) requesting for the data with a defined keyword "User Manual". A response Error: Reference source not found returns with a result, allowing Mobile Phone 502 to perform its task with the returned data.

The URL from the RFID Tag 402 is pointing to a server. It is define to be the object's immediate server. All information that are related about the object can be found through this server. This is Server08 608 as illustrated on Fig 1. From the Mobile Phone 502 perspective, the information comes from Server08 608. It is not aware or need to be aware about the existence of all other servers that contain the object information.

Server08 608 being the object's immediate server is directly responsible to answer the query Error: Reference source not found from the Invoker 501. The response Error: Reference source not found indicates the return result. Being the closest server to the object, it has the full authority to decide how to response to a query request.

In this example the key "User Manual" is not available in the Server08 608. The server propagate the request to its immediate server to seek for the result before returning Invoker 501 with a response Error: Reference source not found. A new query Error: Reference source not found is send from Server08 608 to Server07 607.

Server07 607 after receiving the query Error: Reference source not found, has the full authority to decide the response Error: Reference source not found to this request. The responsibility is passed down to the server. Server07 607 do not have the required key, and a new query Error: Reference source not found is send to its immediate server Server06 606 to seek for a result before returning the response Error: Reference source not found. Server06 606 being a TV manufacturer and provide the required "User Manual" file contains the required key. It returns the result Error: Reference source not found back to Server07 607, and the result gets propagate back to the invoker.

The query has propagated down a chain of responsibility. Each server at an individual level has the full authority to determine its response. Request for restricted information can be refuse by the server. Server can set rules to propagate, block or manipulate the query. Each server have the full control of the return result.

Each server maintain their own information that they have interest in. The server at each level contains their own information related to the particular object. This reduces the tendency for duplicated information, digital storage space and storage cost.

This operational is a form of encapsulation, which models the reality of the distribution chain. The server at individual level has the absolute power and authority to response to the query with their own interest in mind. The servers only needs to be aware about their own immediate server down the chain, and need not be concern on connecting to the later server up the chain. When a query arrive, servers at its individual level will need to response to the request. When the information required is not available, the server is able to reach to its immediate server for further information. This inheritance process facilitates information growth, by preserving the origin of the information; allowing knowledge to grow collectively. Integration of information between various servers/entities can be much simpler. The system also forms a low coupling between the servers.

Knowledge or information about an object is able to grow and accumulative within a confine zone. The limiting boundary allows information that are related to the object to be retrieve instantly and accurately, making it easier to search for related information.

Information is perceive to be acquired directly from the object itself; it is as though the user is communicating directly with the object. Information is no longer another isolated object on its own (for example a user manual booklet), but has become a part of the TV 499 object. Object and its information becomes a single thing. The object contains all the information relating to itself.

Query

A simple query Error: Reference source not found is a web-service function call which uses a ID and a Key to query a URL server for a result. The server after identify the ID and Key, return a corresponding Value as the result back to the requester.

The key correspond to the attribute of an object. As illustrated in Fig 4, a TV can contains many informations. Each information is store as a Key and Value pair. The Key is the attribute of the object, and the Value is the data of the attribute. For example, the user manual is a file which is store under the Key (attribute) "User Manual". The corresponding Value is "<file>This is a manual...</file>" as in Fig 4.

The web-service query can have other various types of parameters to assist the query in getting the required result. A search query can be conducted for the available list of matching Key or Value. The query result can also contains a consolidated list of results from the servers at their individual level. Query helps Invoker 501 to acquire the information that it is looking for. However the query's result is determined with the discretion of the individual server at their hierarchy level.

The information contain in Value can be simple text, or complex data coded in XML format. It is the responsibility of the Invoker 501 to know how to handle the complex data coded in XML format.

It is possible for individual server to contain the same Key. The Key "Website", for example is available in most server. The top most server has the authority to decide how to response to this query. The server can returns the Value of its own Key or return the Value of its immediate server's Key.

Object and ObjectTag

Object can be physical (tangible) or virtual (non-tangible) article. It can also refer to living or non-living things. Object can represent anything.

Physical object can be for example, a small physical needle, a physical cup, a physical table, physical paper document, physical storage medium, a human being, a physical vehicle which may compose of other sub-articles like a chassis, engine, plurality of wheels, etc... Many of our physical world objects do not have the means to connect to the digital domain. This is where the ObjectTag 401 comes in to bridge the gap, allowing virtually any tangible object to have a present in the digital domain.

Object can also be virtual. Information is perceived to be the soul of the object. When an object has creased to exist, its information might still live on and have its useful purpose. An imaginary or replicated object is also another type of virtual, containing informations about itself.

Virtual objects, an abstract, can be for example, a misplaced needle, a disintegrated or broken cup, an imaginary copy of a physical table, digital document, storage medium in the internet cloud, a ghost, a software, etc...

ObjectTag 401 can be part of the physical object or attached in close proximity to the physical object. It can exist by itself (without the physical object) when representing a virtual object. It allows the object a means to be identified digitally over the digital domain in a form of the following tagging technologies, comprising:

- a RFID tag;
- NFC (near field communication), M2M; or
- light or sound sequent form of communication (Video, light, IR, Sound, Speech) generated from the object;
- a bar code;
- magnetic strip;
- visual appearance of the object;
- music, sound or voice;
- QR code; and
- a combination of the tagging technologies.

An ObjectTag 401 is allowed to be digitally duplicated. The copy is actually a digital file containing exactly the information contains in the ObjectTag 401 information. This file represent exactly the ObjectTag 401, allowing itself to be available in the digital domain. This digital copy is a virtual ObjectTag 401 which can be use like the physical ObjectTag 401.

The digital copy can be useful in many situations. When the physical object is lost, the digital copy can serve as an alternative. The object can be digitally shared between users across the network. The copy can act as a bookmark without the need for the physical object to be present. An ObjectTag 401 in another perspective is representing the access to a private information zone.

An ObjectTag 401 that can uniquely identify itself will contain at least two data, namely ID and URL. This will be sufficient to provide the basis of which information related to the object can be found.

Some of the technologies listed may not be able to convey both ID and URL information, which is essential in identifying the unique ObjectTag 401. The typical implementation of technologies like bar code, magnetic strip, image and sound allows only ID to be coded, while QR code is often used to code only URL. The Invoker 501's program will be responsible to

supply the missing information in order to form enough information to uniquely identify the object. The missing data can be acquire from a user or it can come from another ObjectTag 401. It may also be come from a pre-determined configuration in a server or the software itself. It is up to the Invoker 501 to acquire all the necessary information for the operation.

If the coded data on the tag is permanent and cannot be changed (for example a bar-code or a QR-code), a proxy server between the Invoker 501 and its immediate server can be establish to allow remapping of URL server. The proxy server provides a memory storage means for ID or URL information, allowing the data to be over-written. The same bar-code or QR-code can be reuse and need not have to be reprinted when there are any changes. These allows the existing technologies to be backward compatible, allowing all tagging technologies to work on a common platform, achieving the same purpose.

RFID Tag 402 using the 13.56MHz frequency standard is a good means to be an ObjectTag 401, because of the following reason,

- Can be small in size
- Can be conceal. Wireless. Non-line of sight.
- Can contains more information
- Re-writable data, reusable
- Durable
- Passive, do not need battery
- Shorter detection range
- Cheaper

RFID Tag 402 can communicate wireless, do not need line of sight and battery to operate. Size can be small, making it easy to embed in most of the physical objects. The read/write data memory enables the tag to be re-use, allowing any previous information to be inherited, hence preserving the information. The shorter detection range allows the targeted object to be easily differentiated through physical scanning proximity.

RFID Tag 402 is used to represent an object, allowing the object to be identify and interact in the digital domain. This insight is means that if the object's physical existence do not serve any significant purpose, it can be easily replaced with RFID Tag 402 which is much cheaper. Examples can be user manual, digital storage, user interface devices, etc...

RFID tag

The RFID tag can have features to further enhance the operation of preserving the information of the object. It will have security mechanism to protect itself against unauthorised tag manipulation. The RFID tag is able to allow over-writing of new data permanently or temporary. Permanent data writing will prevent new data from over-writing it, which will make the RFID tag final; ensuring it to be secure. This can ensure that the source is genuine. Temporary data allows the tag to be restored with the original or previous set of data (ID or URL data for example). The data restoration is done through an IC (integrated chip) hardware means rather than through the higher software level. This will allow an application to temporarily transfer the object's ownership, and be able to restore the object's ownership at a later stage. This can be applicable for example, logistic and transportation where the goods ownership or responsibility is temporary.

Conclusion

This embodiment provides a means for non digital object to be available digitally, providing us a means to interact with virtually any forms of object. It allows non-tangible informations to be linked to the object allowing genuine information to be easily, and instantly available. As the information grows with time, the embodiment helps to cumulate and preserve the origin of the information. The embodiment provides us a productive mechanism to search and manage information efficiently in this information flooded era.

CLAIMS

What I claim as my invention is:

1. A method for associating digital information that are related to an object, comprising:

- An ObjectTag 401, as a means to identify said object;
- An Invoker 501 to interpret said ObjectTag 401 and query for information from it's immediate server (illustrated as Server08 608 in Fig 1 and Fig 3); and
- Said server to response the query with a regulated result, or propagate the query to it's immediate server(s) for a result.

whereby this method promotes collective knowledge by preserving the origin of information; allowing individual entity to provide and regulate information of their interest, forming a pool of cumulating information which are related to the object; such that a desired information can be conveniently stored, summoned or searched within a scope relating to the object; commencing from the object's closest kin (the immediate server) which has a direct ownership and control over the object's information.

2. The method of Claim 1. wherein said object may be a composite of other forms of objects, and said object can refers to any physical objects, a few illustrating examples comprising:

- a physical small needle;
- a physical cup;
- a physical table;
- a physical paper document;
- a physical storage medium, hard disk, thumb drive, memory card/chip or magnetic tape;
- a human being; and
- a physical vehicle, which compose of other sub-objects like the chassis, engine, a plurality of wheels, etc...;

or any virtual objects, a few illustrating examples comprising:

- the small needle that was misplaced;
- the cup that was disintegrated or broken;

- an imaginary copy of the physical table;
 - a digital document which resides in a data storage medium;
 - a storage medium in the internet cloud; and
 - a ghost; and
 - a software.
3. The method of Claim 1. wherein said ObjectTag 401 contains at least one of the following digital information, comprising:
- an ID (Identity) in the form of data bytes that identify the object; and
 - An URL (uniform resource locator) address of the object's immediate server, which is a gateway where the object's information can be retrieved.
4. The method of Claim 3. wherein said ObjectTag 401 is part of the physical object or attached in close proximity to the physical object or can exist by itself when representing a virtual object; having the means to identify itself digitally, can be in a form of the following tagging technologies, comprising:
- a RFID tag;
 - a digital file containing ObjectTag 401 information, representing a virtual instance of the physical object;
 - NFC (near field communication), M2M (machine to machine); or
 - light or sound form of communication (Video, light, IR, Sound, Speech) generated from the object;
 - a bar code;
 - magnetic strip;
 - visual appearance of the object;
 - music, sound or voice;
 - QR code; and
 - a combination of the tagging technologies.
5. The method of Claim 3. wherein said ObjectTag 401, uses a near field RFID tag (13.56MHz) which is integrated or attached in close proximity onto the physical object in order to relate information to the object; or uses said RFID tag by itself to represent a virtual object.

6. The method of Claim 3. said ObjectTag 401 is a digital file containing ObjectTag 401 information, in order to relate to a virtual or physical object.
7. The method of Claim 1. wherein said Invoker 501 consist of software operating on a computing device attached/integrated with an appropriate reader/sensor for the ObjectTag 401, and is capable of data query from said ObjectTag 401's immediate server through the internet network; said immediate server's URL address is provided by said ObjectTag 401 or said software; said computing device can be in the following form comprising:
 - a mobile phone, integrated or attached with an appropriate reader/sensor.
 - a laptop or desktop or tablet computer, integrated or attached with an appropriate reader/sensor; and
 - an embedded device, micro-controller based device, integrated or attached with an appropriate reader/sensor.
8. The method of Claim 7. wherein said appropriate reader/sensor can be a RFID reader, a camera, a microphone a bar-code reader, magnetic sensor, or other form of sensors suitable for use with the ObjectTag 401
9. The method of Claim 7. wherein said Invoker 501 can be operated by a human subject, or can be automated, to trigger the action which will summoned or query for information.
10. The method of Claim 7. wherein said data query will need at least an URL data, plus other data comprising:
 - a command (function or method);
 - an ID;
 - a key word or phase; and
 - other parameters as required by the command;

in order for said software to make query to the immediate server; and when the data necessary to make a query is insufficient for the query after reading the ObjectTag 401, the software (in the invoker or server) will have other means to obtain the data; means of obtaining the data to complete the query could be for examples (pre-defined data from software/files, asking for user's input, reading another ObjectTag 401, or query predefined server(s)), whereby this will allows said method to be backward compatible to the various

tagging technologies which have limitation in its features, therefore allowing all tagging technologies to work seamlessly on a common architecture platform.

11. The method of Claim 10. wherein said data query sends and obtains a result in XML format; the returned result can contains the desired information or a further instruction to obtain the desired information.
12. The method of Claim 1. wherein said information is a pair of Key and Value as illustrated in Fig 4, an example representing the attribute and data of an object.
13. The method of Claim 12. wherein said Key and Value is stored and communicated/queried in XML (Extensible Markup Language) format.
14. The method of Claim 1. wherein the server, either physical server or virtual/cloud server, is set-up by individual entity (can be corporation, department, team, or a person) who has the interest in providing and maintaining information that are related to said object.
15. The method of Claim 1. wherein the regulated result empowers the server with the authority to manipulate the result which can be obtained through numerous means, consisting of:
 - result obtained from the server's own local/remote resources for examples data storage and networked devices;
 - result obtained from a new query that was sent to its immediate server(s); and
 - a combination of the above mentioned.
16. The method of Claim 1. wherein the query propagate in a reclusive manner through the hierarchy of servers forming a chain of responsibility, and will halt in a number of situations, comprising:
 - when all the result(s) is found;
 - the request is block or null result returns from all its immediate servers.
 - when the request reaches the last server of the chain of servers.
 - when a query request time-out occurred.

17. The method of Claim 16. wherein the hierarchy, is formed in a supply chain distributing process where the object changes ownership through overwriting of the information on ObjectTag 401;

whereby the origins of the chain of information providers having interest over the object can be preserved.

18. The method of Claim 17. wherein the overwriting of the information on ObjectTag 401 can be done through a proxy server, in cases where ObjectTag 401 itself do not have any means to allow writing or overwriting of information data;

whereby the proxy server is able to extend the capability that is limited on an ObjectTag 401, allowing various tagging technologies to work seamlessly on a common architecture platform.

19. The method of Claim 16. wherein the said hierarchy can be a complex tree structure as illustrated in Fig 3, with object being a composite of other sub-objects; with several servers linking up, forming the network of information provider related to ObjectTag 401.

20. A RFID tag, wherein the improvement comprising:

- a data memory section D1 containing an URL data which can be protected against over-written with a password;
- another data memory section D2 containing an original URL data pointing to an ancestor server which is protected against read and write with a password;
- said memory D1, if protected, can only be over-written with a password provided by its ancestor entity;
- a restore command to the RFID tag which can over-write the data stored in said memory D1 with said memory D2; and
- disable a RFID tag permanently;

whereby this RFID tag will be able to used with claim 1. for inheritance and added security purpose, protecting the data that is stored in the tag from unauthorised data over-write and allows recovery of the over-written data; to provide a better integrity of the information relating to the object over existing RFID tags. (consider multi-level of recovery. recovery from different level of vendor.)

ABBREVIATION

- App Application Software
- OOT Object Oriented Technology
- IT Information Technology
- UI User Interface
- XML Extensible Markup Language
- ID Identity
- URL Uniform Resource Locator
- RFID Radio-Frequency IDentification

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