The concepts of Web3 first represented in 2013

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Central & Eastern European Software Engineering Conference (October 24, 2013): https://2013.secrus.org/lang/en/

Published: 2013-10-24 | Conference Report
Presentation 2013 (slides 18-24): https://2013.secrus.org/2013/files/008_bodrenko.pdf
Report video 2013 (minutes 12-18):
https://2013.secrus.org/submitted-presentations/video-calling-system-and-browser-for-i2p-network
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Abstract. The concepts of Web3 were first represented by Andrei I. Bodrenko in 2013. Andrei I. Bodrenko stated that the new iteration of the Internet is based on serverless technologies comprising such features as: serverless data exchange, serverless electronic mail, serverless private networks, serverless social networks, decentralization, and these features are carried out by using peer-to-peer overlay computer networks operating over the Internet. It is significant that blockchains are typically managed by a peer-to-peer (P2P) computer networks, and the implementation of the blockchain is done without the need of a trusted authority or central server. Andrei I. Bodrenko invented Web3 in 2013 by publishing: the video report at the largest Central & Eastern European conference in the field of Software Engineering (see for details: Presentation 2013 (slides 18-24) and Report video 2013 (minutes 12-18)), and by publishing Patent document RU2013154454A representing the key feature of Web3 in December 06, 2013.

Video Calling System and Browser for I2P network

The text of the Andrei I. Bodrenko's report is represented below:

Slide 1:

Good morning. My name is Andrey Bodrenko. I will deliver a speech on the importance of serverless technologies namely data exchange via the I2P network. And we will talk about a new video-calling system that allows secure video calls to be made over the I2P network.

Slide 1.

Slide 2:

Nowadays the world is making a further quantum leap forward of computerization. The main reasons for this are the miniaturization of the microprocessors and the decreasing cost of mini-computers. There is today enormous growth of the computing power of modern mini-computers. Now the majority of mini-computer specifications are comparable with the specifications of a desktop. Also mini-computers enable high definition video processing.

We are facing the new age of computerization when almost every electronic device will be connected to the Internet. For example: a device which controls the temperature of water in an aquarium, a smart fridge with the ability to order food over the Internet. The concepts of smart homes become in demand for many users. Therefore we may make a realistic forecast: there will be a billions of new mini-computers connected to the Internet.

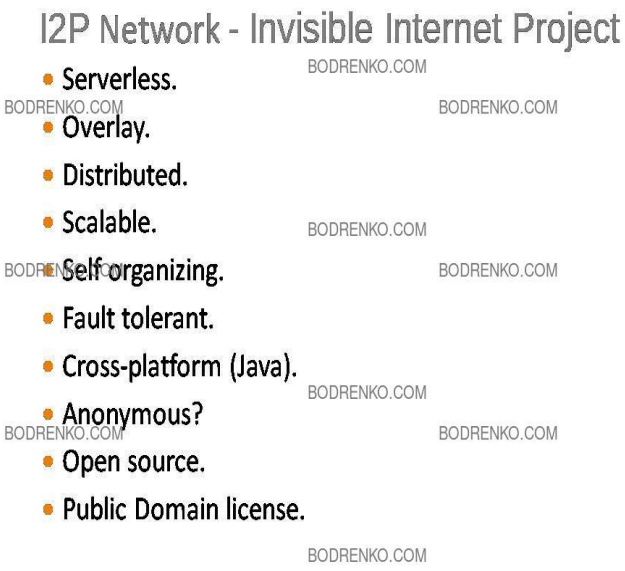
Hence there is a need to remotely control and access that devices. In my opinion video surveillance systems are very important for control purposes: because in many cases a picture paints a thousand words and it is better to see once than to receive information in other form. For example: we can glance into a fridge distantly and order food-stuffs.

It is very difficult and expensive to control a billions of various devices from a single center. If the main server breaks down the consequences can be very heavy. There is a need of fault tolerant and scalable control systems. Using of serverless technologies is the only way out of this situation.

Slide 2.

Slide 3:

The best example of serverless technology in my opinion is the I2P network, Invisible Internet Project. The I2P network has many outstanding characteristics so needed for the coming new age of computerization. I2P is a scalable, self organizing, fault tolerant network. Though this network does not provide absolute anonymity, the protection of connections in the I2P network is the many times better than in the Internet. It is very important that I2P is a cross-platform, open source, and has a license Public Domain. These are the preconditions for the further development of I2P and its growing significance.



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The I2P network uses two types of representation for addresses: base64 destinations and Base32 hostnames. These addresses have the same functionality as a static IP address in the usual Internet. Base64 destinations accompanies pseudo-domain name in the form: name.i2p. Base64 destinations represent information on computers connected to the I2P network and the methods for direct, point-to-point communication between two routers. Base32 hostnames are shorter than Base64 destinations and are more preferable in many cases because there is no need to register them in the Address Book. Sites of the I2P network are called eepsites and are reachable in web browser via pseudo-domain name in the form: name.i2p or Base32 hostnames.

Slide 4.

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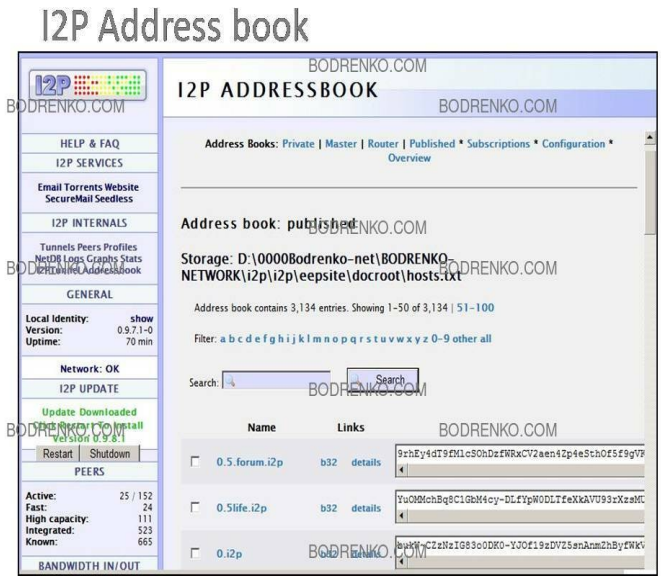
Pseudo-domain names and its Base64 destinations are published in the user's Address Book. Only those Pseudo-domain names which are in the Address Book may be used to reach eepsites in the I2P network.



Slide 5.

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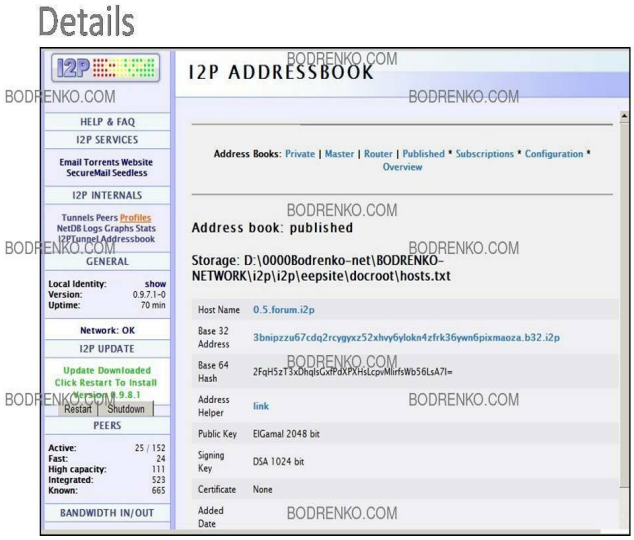
User are able to read the Address Book and he knows Base64 destination and Base32 hostname of his eepsite. User himself sets the Pseudo-domain name of his eepsite. Pseudo-domain names are checked for conflict with existing pseudo-domain names in the user's Address Book. If the pseudo-domain name does not exist yet this name can be imported by others' address books. Base32 hostname is unique and can be used without placing it in the Address Book.



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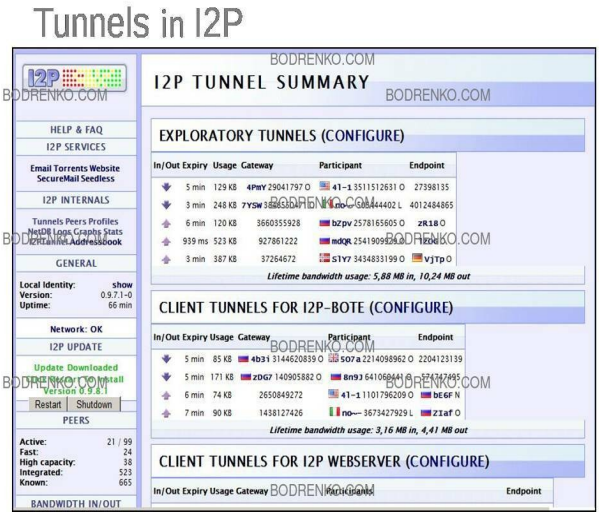
Within the I2P network all messages are passed through a virtual tunnels of peers. There are inbound and outbound tunnels. All messages are always encrypted. How encryption is done depends on whether the tunnel is an inbound or an outbound tunnel. Encryption in I2P takes advantage of symmetric AES encryption and is cryptographically strong. Users always are able to read the properties of all tunnels there his computer is taken part.



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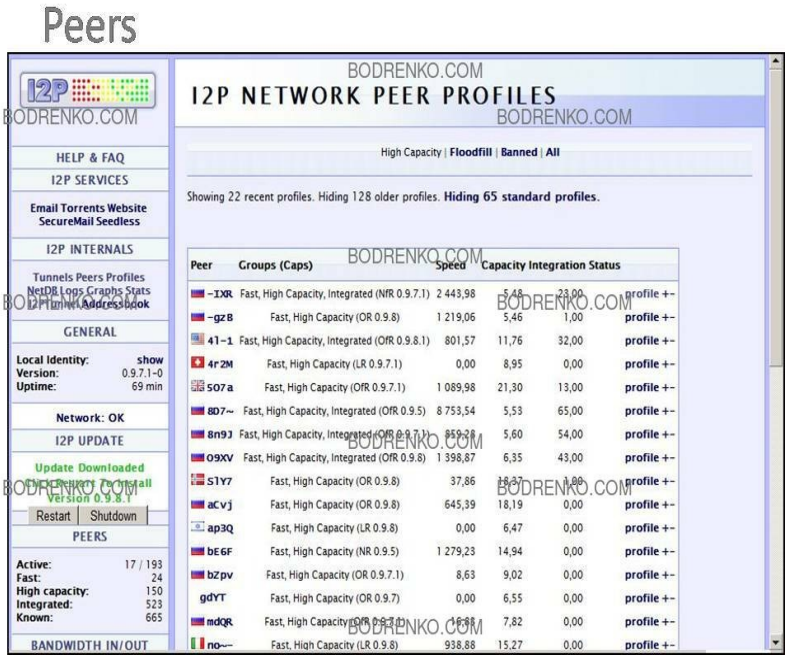
I2P is a peer-to-peer network in which individual nodes act without the use of a centralized internet server. I2P users always are able to read the list of peers connected to his node via tunnels, and the properties and profiles of all that peers. This aspect is very helpful in gauging the internet connection speed for every peer in order to set correctly the parameters of connections for every pair of nodes. Because every I2P node has its own connection speed in the I2P network.



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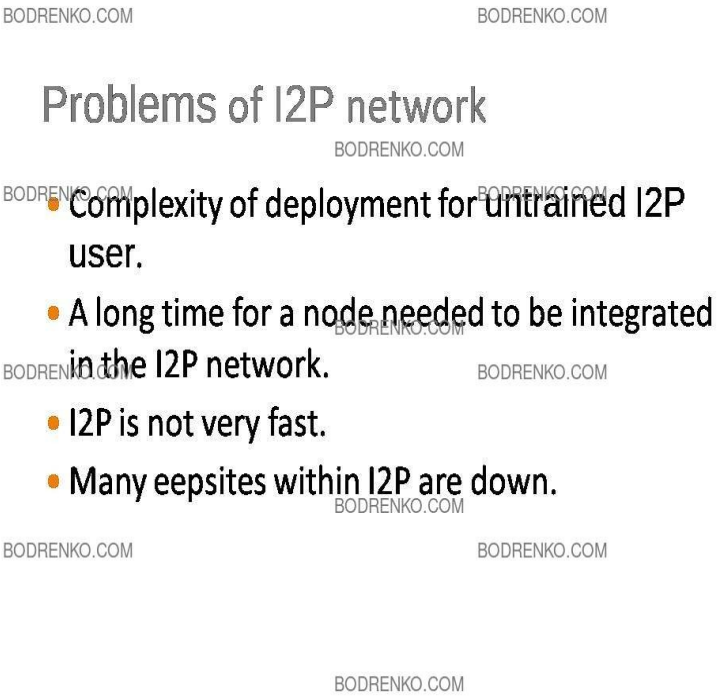
In spite of fact the I2P is fault tolerant network, I2P faces some problems. The first problem is the complexity of deployment to untrained I2P user. The second problem is a long time for a node needed to be integrated in the I2P network (from a few hours to several days).

The next problem is that I2P is not very fast. And the main problem is that the most of the eepsites within I2P are down. I would say that all these problems are interrelated.

I would represent the ways of resolution of these problems. For example if we make the ease of deployment to untrained I2P user than more users will use I2P. If the most of the eepsites within I2P will be online than I2P will be faster and the time for a node needed to be integrated in the I2P network will come down.



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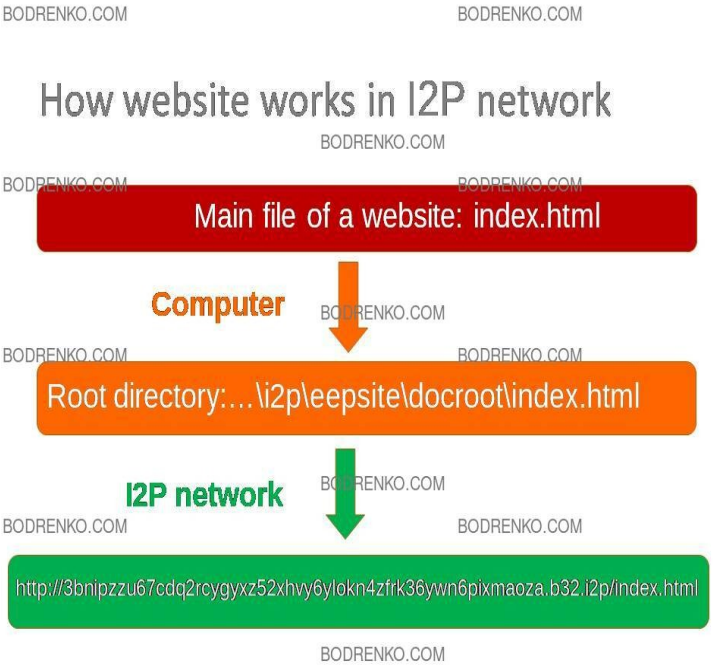
Sites of I2P network work as follows. After a node becomes integrated in the I2P network I2P user are able to set up his own eepsite. The root directory of eepsite is …\i2p\eepsite\ docroot\. The website main page index.html (or index.php) is placed in that root directory and it becomes reachable from any node connected to I2P network via an address http:// … oza.b32.i2p/index.html . Also user can install any software for hosting: Apache HTTP-server, PHP, mysql and the like.



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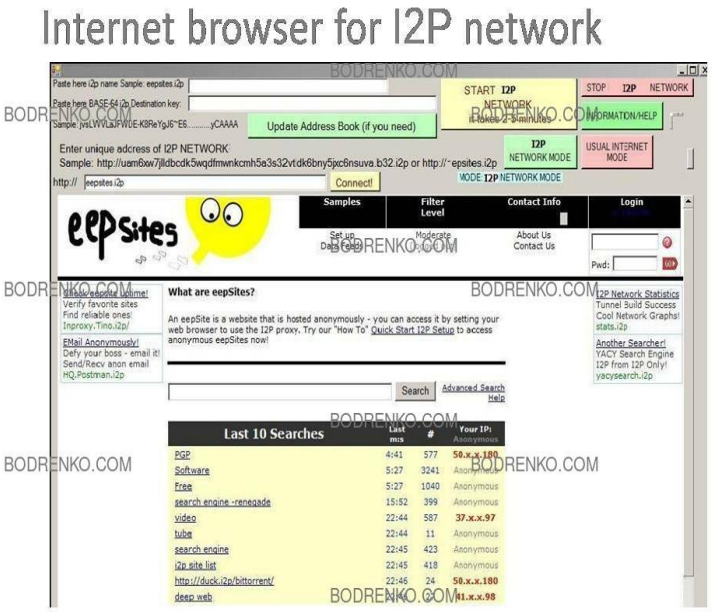
In order to make the deployment of I2P easer I developed a special web-browser for I2P network. For making I2P connection user just pushes two buttons and waits not a very long time. Project was written in C# for platform .NET in OS Windows. This I2P browser can be served as the base for communications between the nodes in I2P network. Sending and receiving of messages and images can be made via this I2P browser. Using this browser is a simple way of receiving video frames. Using this browser user can watch distantly video frames and video files received from web-camera. I used component WebBrowser for applications Windows Forms. There is important feature: I2P network does not disable connection to the usual Internet. User is able to connect I2P network and the usual Internet simultaneously. That increases his opportunities.



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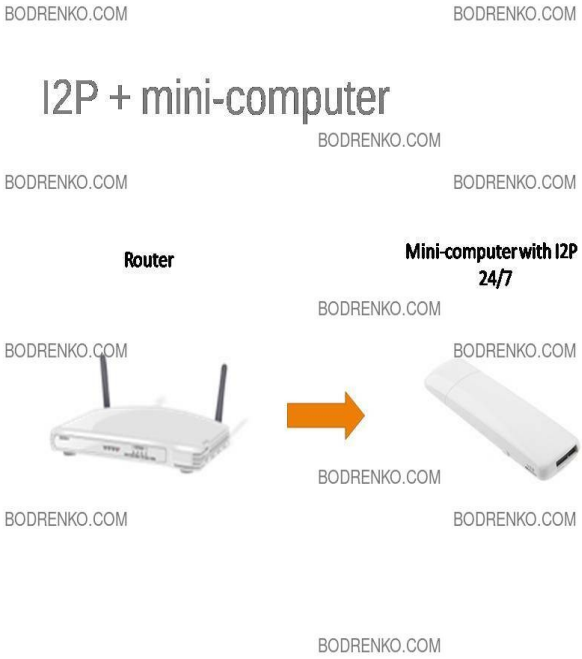
Using I2P network with mini-computer running 24/7 is the base for the further development of serverless technologies and creation of new breakthrough technologies.

Nowadays there is a great chance for development of I2P network due to appearance of mini-computers of a very low cost value (about twenty five dollars). There could be installed Unix-like operating systems Debian, Ubuntu and the like on those mini-computers. I2P project could be installed in those operating systems and enabled unlimited internet connection. Mini-computers have proven themselves capable of withstanding conditions running 24/7 due to their low energy consumption. Therefore user is able to host his site in I2P network very easily.



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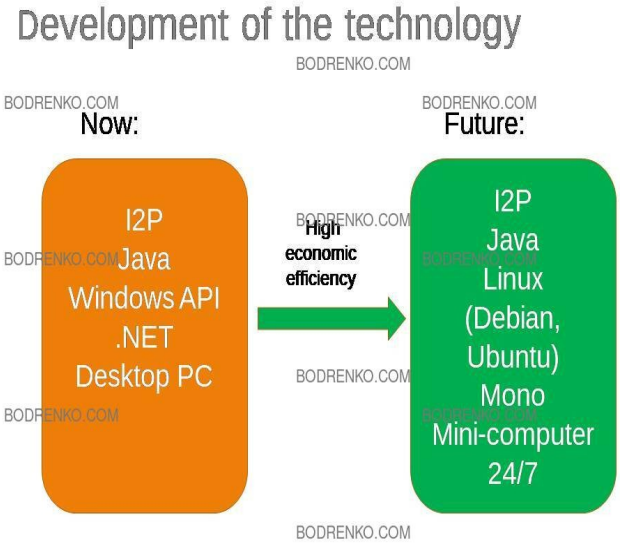
At this moment Video-calling system is written in C sharp and works on operating system Windows on .NET platform on desktops. This means that the cost of operation with condition running 24/7 of this Video-calling system is rather high and does not attract attention of a large number of new users. I suggest to rewrite program code of this project for using in operating systems Debian and Ubuntu on mini-computers in order to attract new users. There is high economic efficiency of this approach due to using of mini-computers of a very low cost value.

The cost of Video-calling system for one user is about $100 including costs of mini-computer, web-camera, router and the auxiliary equipment.

This project offers to the user a rich set of functional capabilities. Now this project is in the process of migration to Linux from Windows. Software is also planned to be developed for organizing video surveillance system on Linux.



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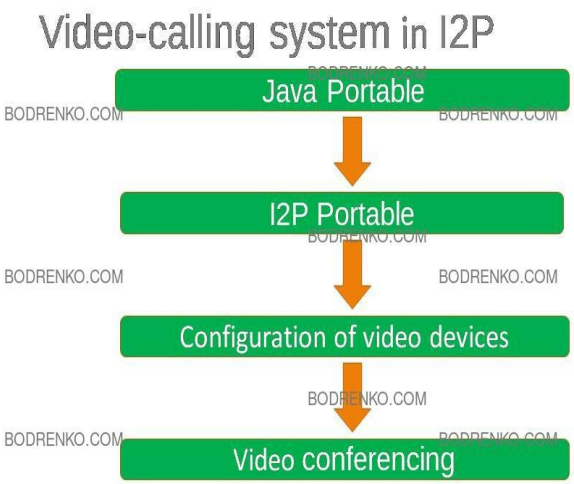
In this project I use Java Portable in order to run I2P and Video-calling system on operating system Windows with no installation required. The scheme of work of Video-calling system is following: Java Portable is first launched, after project I2P Portable is also launched. Then user configures the video devices connected to the computer and makes the video recording.



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The user selects a video device - a video source to record from: web-camera, TV tuner or Video capture card by using Windows API. After this a user sets the frame rate for video capture. Captured frames is placed as the set of image files in the root folder of I2P site (in … i2p\eepsite\docroot) and sent to the user-receiver.

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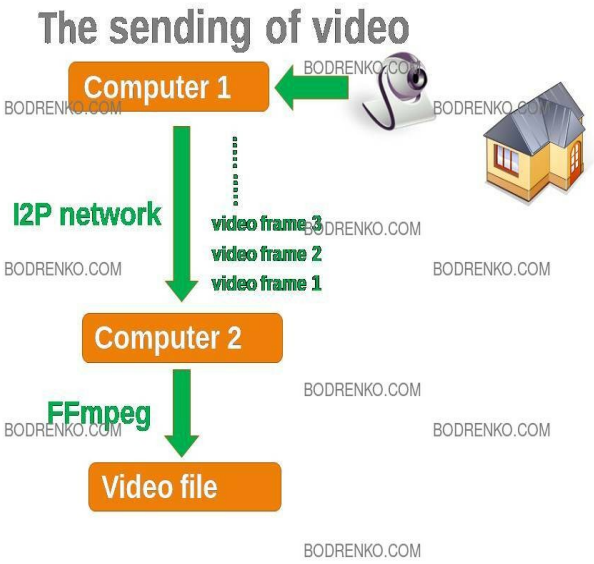
Slide 16:

From that folder the image files are being downloaded by the user-receiver of the I2P network. The user-receiver can also select frame rate for receiving the video frames according to the speed of the I2P network. User gets his own images in the right part of the Windows form, and he gets the images from the user-receiver in the left part of the Windows form.

Slide 16.

Slide 17:

The sending of video is proceeding as following. The frames taken from web camera are being sent to the user-receiver through the I2P network. A free software project FFmpeg is ran on the user-receiver side. Program FFmpeg makes video file from the set of video frames received. And the user-receiver watches video.



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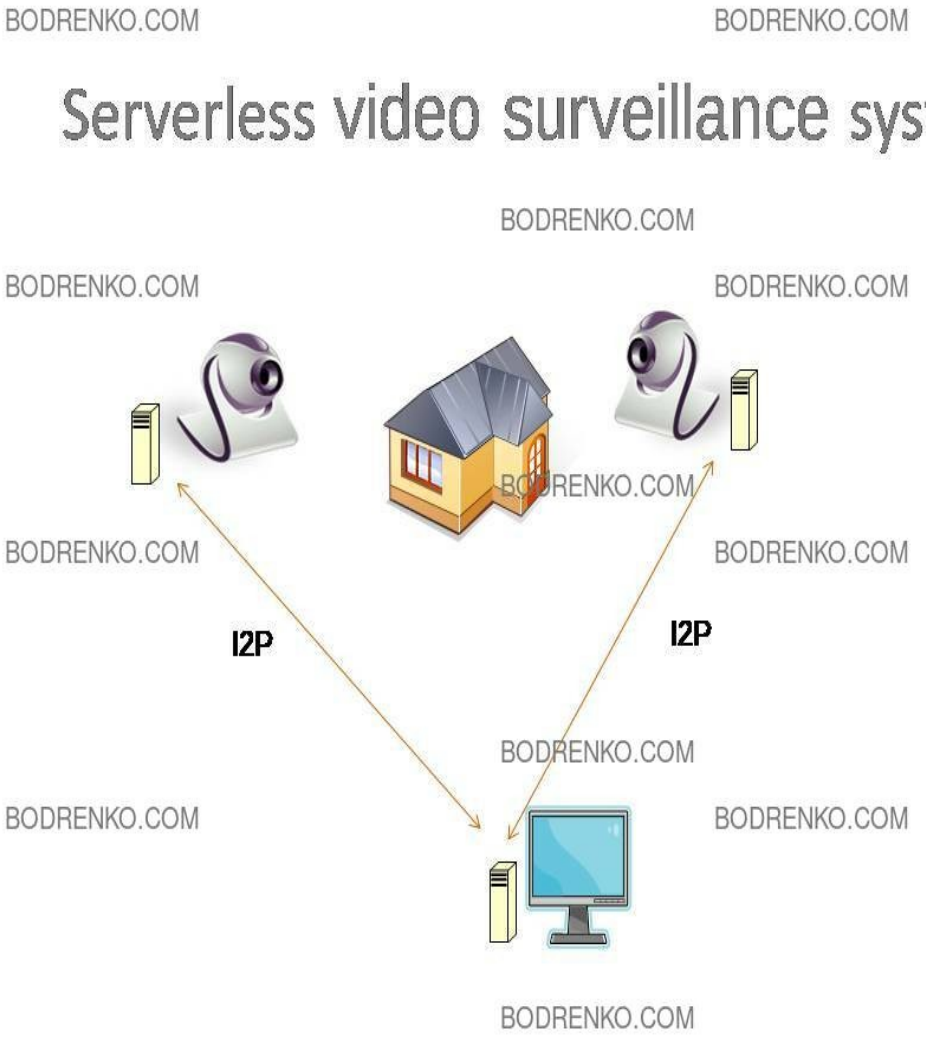
I would suggest to use my project in the I2P network with mini-computers. This technology can be used for creation of video surveilance systems. There are many such situations that it is needed to survey from time to time: synoptic observations, monitoring of employees (if they are at the workplace). The important feature is that the number of web cameras is not limited in this video surveillance system.



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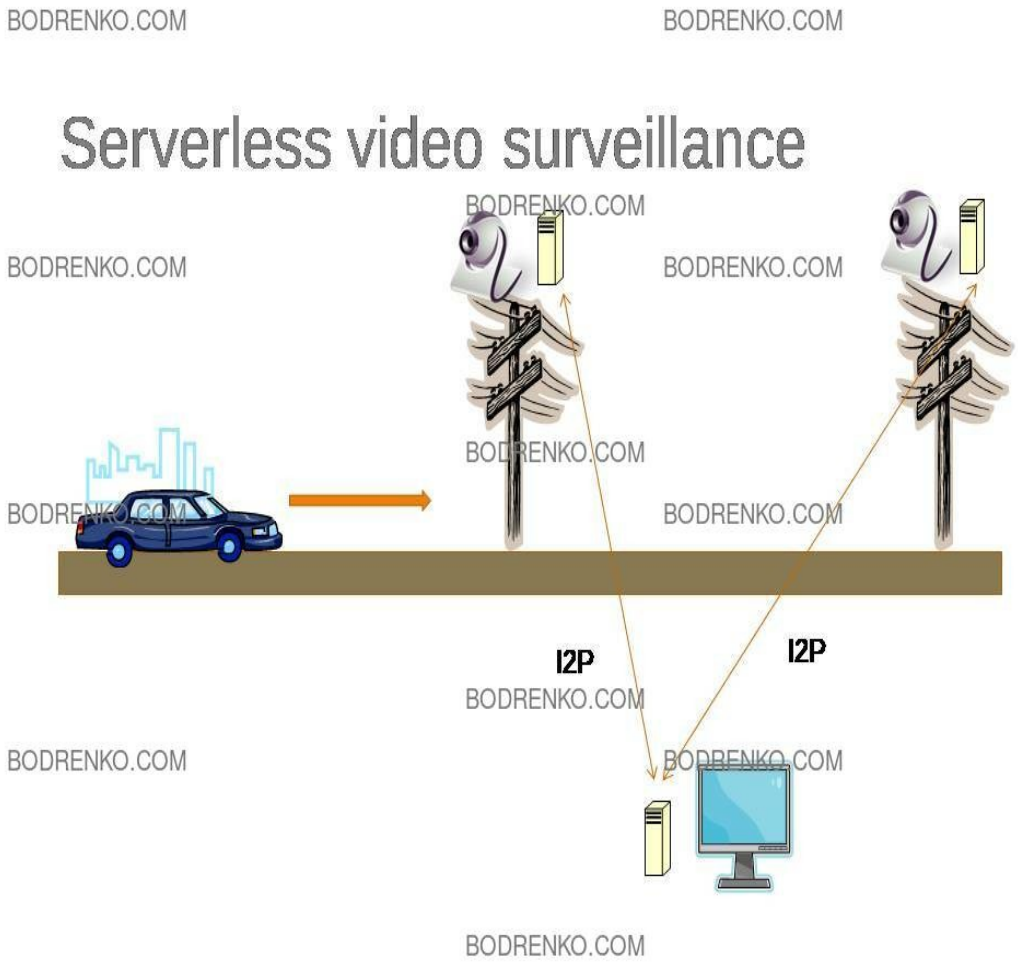
Due to the fact that the I2P network is not very fast it is not very easy to send a video via the I2P network. Therefore now the I2P network is more suited for capturing and sending recorded video images on a time lapse. Images may be monitored remotely when the computer is connected to the I2P network. But a user can record and save a high-resolution video on a connected hard drive. This way video surveilance system can be used as a Video Surveillance system for Traffic Monitoring.



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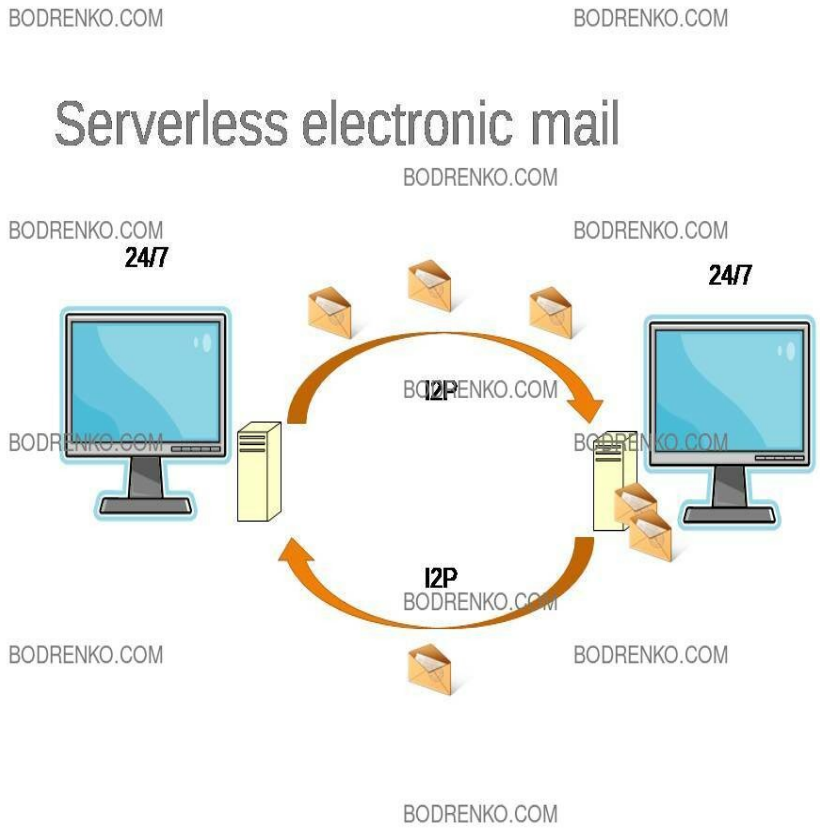
Another important aspect is the use of represented technology in creation of serverless electronic mail of a new type. The project is installed on a mini-computer and runs 24/7 with a generated Base32 hostname. A Base32 hostname is used as an email address in this electronic mail. Then a mini-computer serves as a mail box for the electronic letters. This results in the fact that electronic letters are received, physically located and saved on a hard drive connected to the user's mini-computer, and are not located on any external server outside user's office or apartment. The I2P network works enough fast to send electronic letters up to 10 Mb. It is well known that average size of electronic letter is much smaller. This serverless electronic mail is a fault tolerant and will function without problems because the I2P network is fully decentralized, distributed, dynamic, scalable, self organizing and fault tolerant network. I assume that the usual electronic mail will face strong competition from this serverless electronic mail for many aspects. I think that a large number of users will want to have a physical mail box for electronic letters in their apartments. Moreover a user is not required to sign any user agreements. Also this serverless electronic mail is protected against mass e-mails theft.



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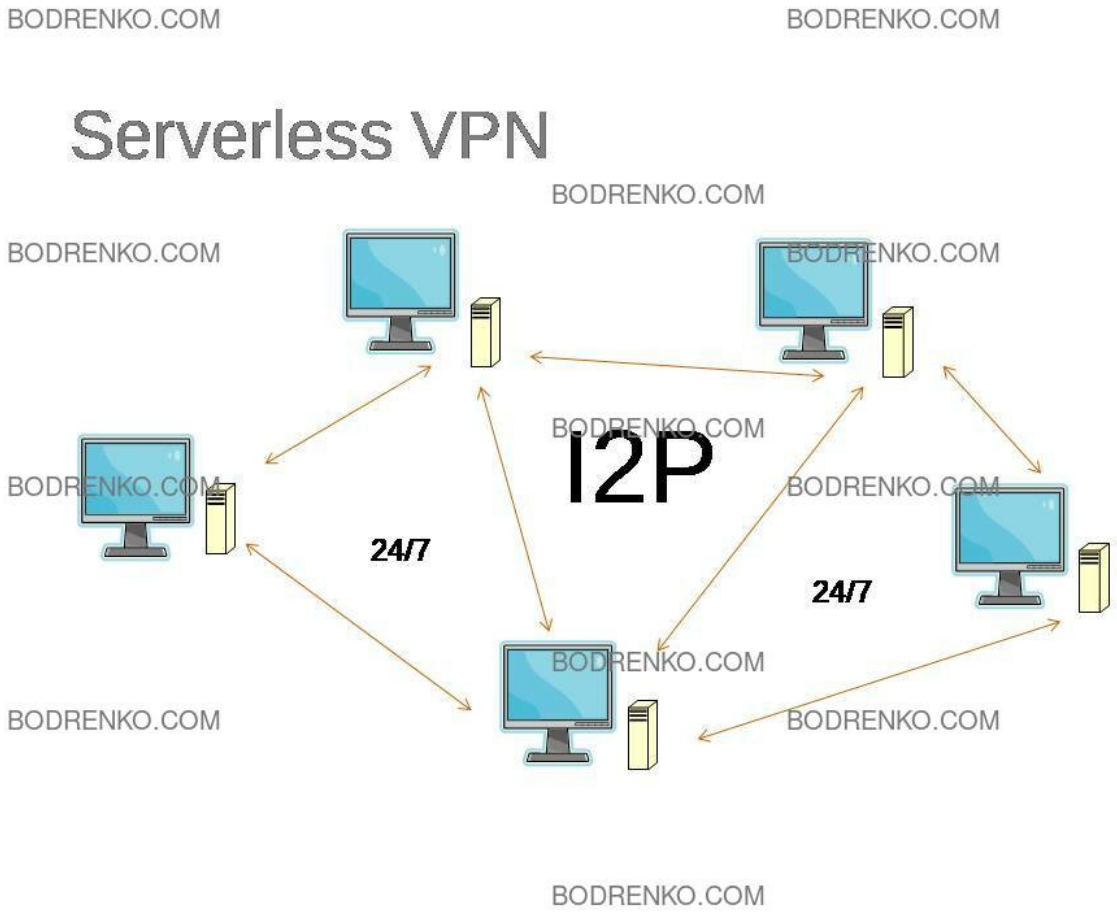
Therefore one of the applications for this technology is a remote control of devices connected to a local network. This technology can be used to provide data exchange between computers. This means that we will have serverless private network. A user can send and receive commands, provide a remote control of a computer.



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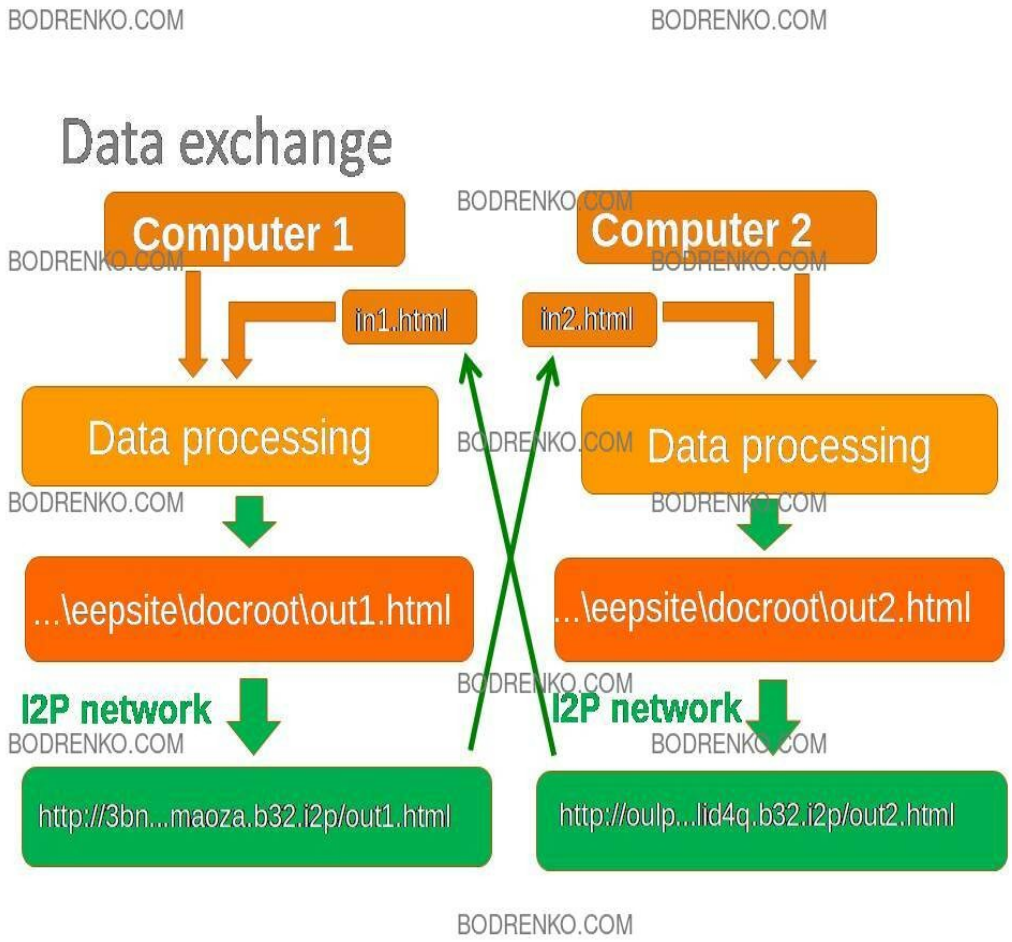
Data exchange between computers connected to the I2P network is done as follows: the file from the first computer out1.html is placed in the folder ...\eepsite\docroot\out1.html after that it becomes reachable via the Base32 hostname for any other computer connected to the I2P network. The second computer downloads this file and after processing of data places the result as a file in the folder ...\eepsite\docroot\out2.html. The first computer does similar operations. Those operations are done cyclically.



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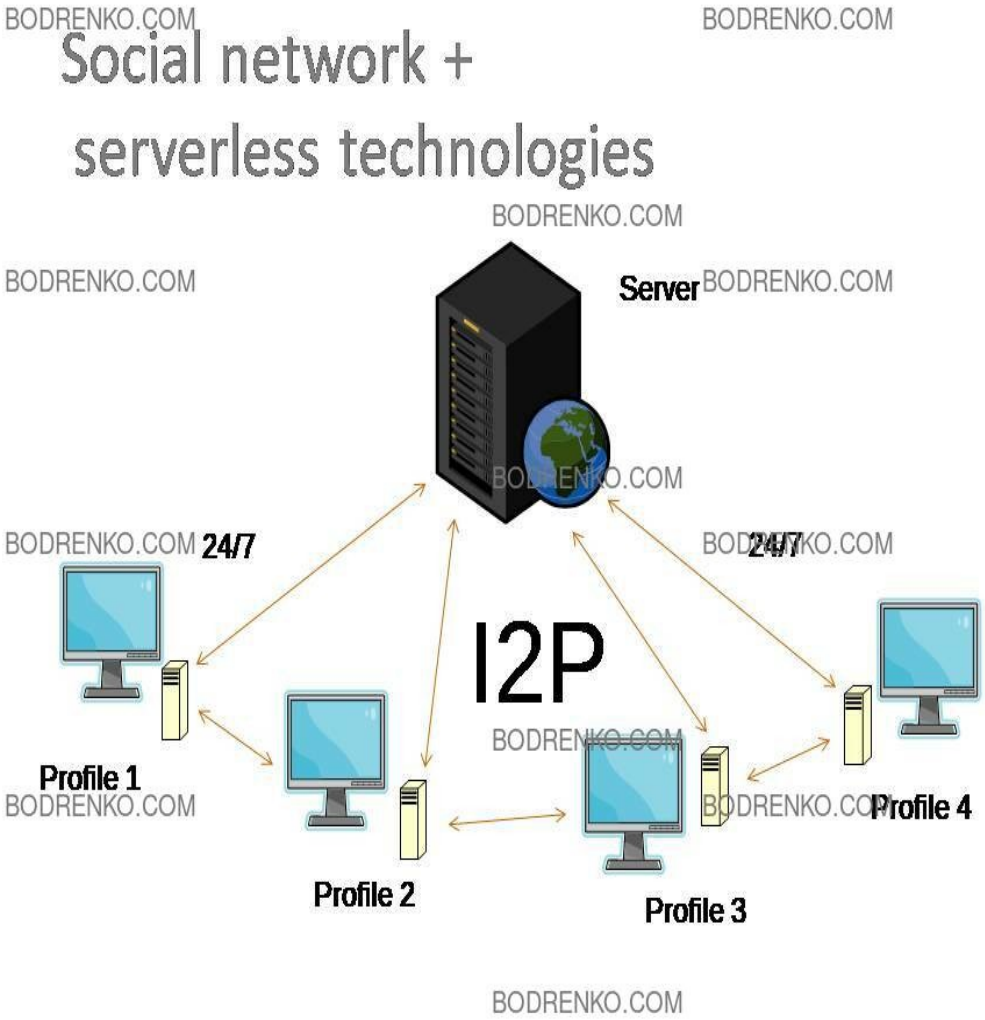
This technology can be used for creation a social network where the user's profiles are located phisycally on thear computers. It is a social network with hybrid model. There is a central server with links that helps users find each other. MIT Users of Bodrenko's Patents Review, a magazine published by Massachusetts Institute of Technology, represented a list of the top ten Breakthrough Technologies of 2013. One of them is Temporary Social Media. Temporary social media becomes popular among Internet users. Interactions in temporary social media can be conversations which are not stored in server forever. All messages vanishes automatically. I suppose that the technology represented in my talk also can be used as a temporary social media.



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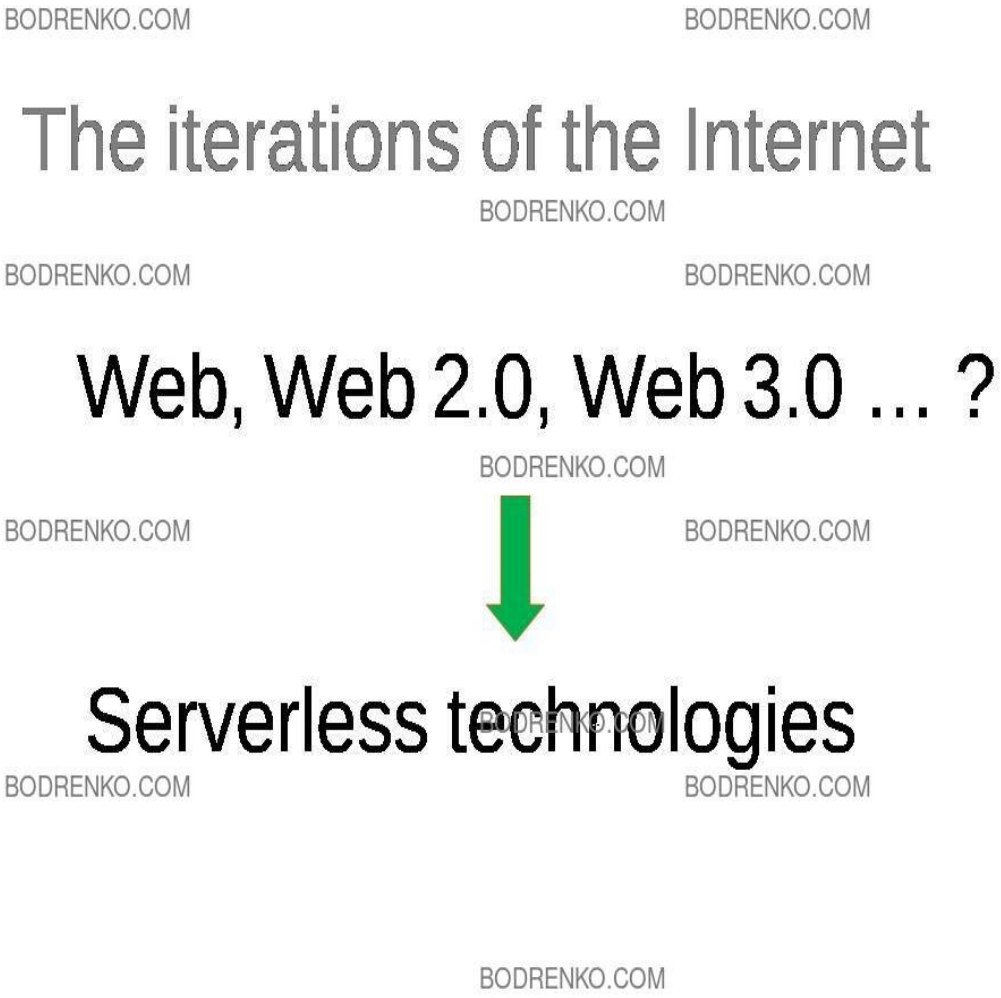
I suppose that the technology represented in my talk may radically change the lives of Internet users. Each user by buying low cost devices will have the same opportunities as a hosting company but at the smaller scale. The historical development of the Internet has led to the Web 2.0, and Web 3.0. Users of online services will become online service providers. Each user will operate as an online service provider but at the smaller scale. If the technology represented in my talk will be widely used then we will have a new quantum leap for the development of the Internet. I think it may be a good reason to assign the next index to the Internet.



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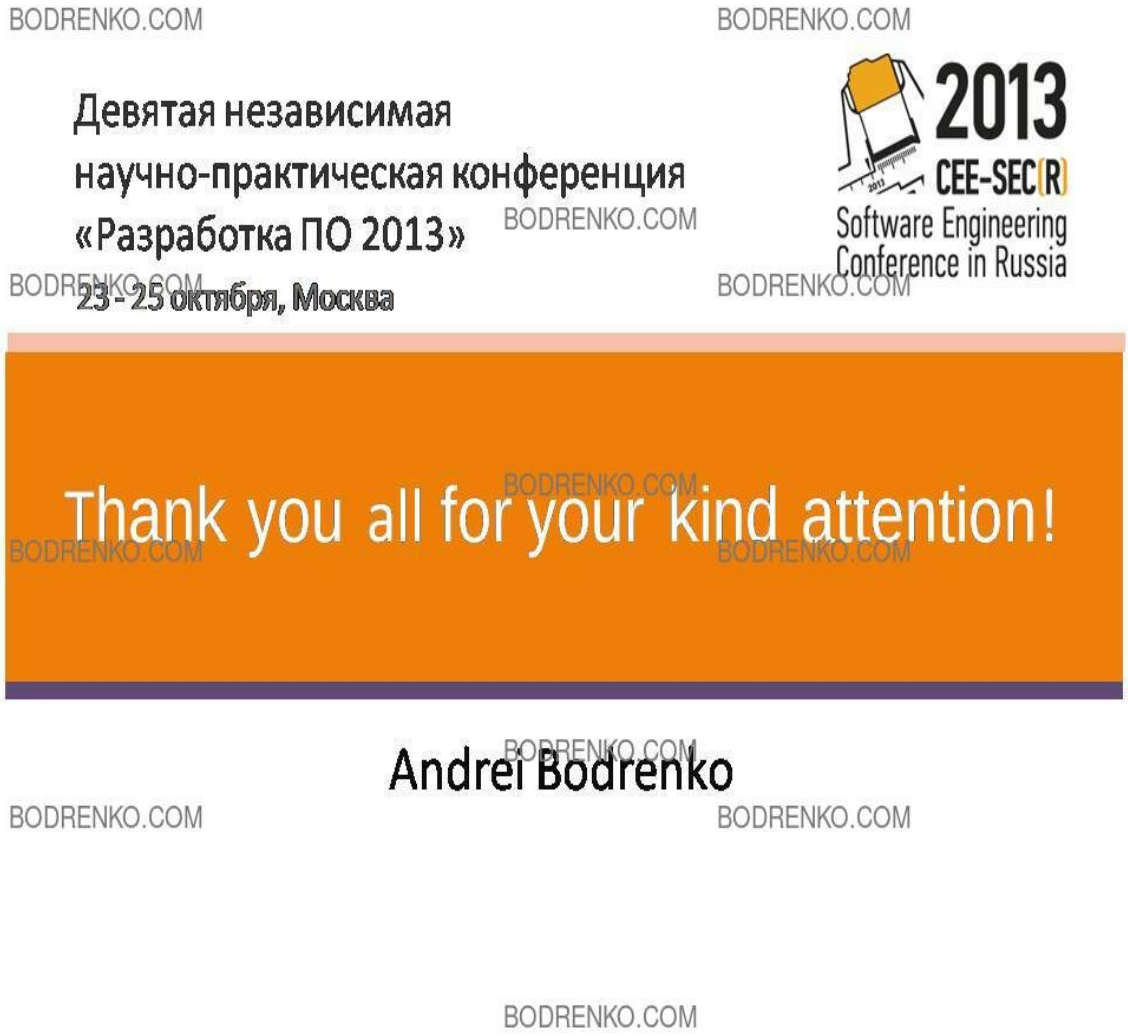
Finally, I would like to emphasize that all represented technologies are implemented, properly functioning and ready for mass use. I thank you all for your kind attention.



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