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REVISION AND IMPROVEMENT OF THE HS CABLE NET INFORMATION SYSTEM

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by

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REVISION AND IMPROVEMENT OF THE
HS CABLE NET INFORMATION SYSTEM

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ECONOMICS, MANAGEMENT

REVISION AND IMPROVEMENT OF THE HS CABLE NET INFORMATION SYSTEM

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ABSTRACT

Through the cable internet speed levels incerased and prices decreased which led to great user satisfaction, however, still there are certain issues needed to be revealed in order to achieve a greater level of service quality and also to meet the consumer needs.

The purpose of this project is to evaluate problem-solving solutions for the information system of the HS cable internet. After a brief analysis of the cable internet history and IS structure the project focuses on lacks and problems detected during the analysis, implementing new software applications with the aim of detecting and preventing problems the HS cable internet deals with. Beside problem detection and prevention another task was to accelerate the problem-solving process by implementing another application, related to the problem detection software, which will print intervention prescriptions on site fulfilled by the workers in charge. Implementing these ideas will also lead to a better operator-user relationship, since problems will be detected, prevented and solved in a quicker time frame.

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ACKNOWLEDGEMENTS

First of all I want to thank my parents and my professor, without their support and love this all wouldn’t be possible. My project work couldn’t be accomplished without the great help of prof. Meliha Handžić.

Introduction to project

The cable internet was a revolution for enabeling users to access the internet. The previous technologies were far from user-friendly, offering low speed levels and high prices.
As known in telecommunications cable Internet is a form of a broadband Internet access that uses the cable television infrastructure. Cable Internet is the bridge from the Internet provider to the subscriber. It is connected to the existing cable television network infrastructure but also many factors are important such as telephone networks, cable modems and providers. All these fact are crucial for providing the best service to consumers. [1]

The HS cable television and internet exist since the year 2005. From the very beginning on great efforts were made to ensure a competitive position on the market. Also the gaining of pottencial users and their trust was a big issue since the cable internet technology still was unknown territory at that time. But that condition should not last for long.
Soon people realized that through the cable internet speed levels incerased and prices decreased which led to great user satisfaction . Through years of hard work and improvement. the HS cable internet became one of the leading providers at the domestic market. Although it was a long and hard way to go, now a days the HS cable internet provides its services for more than 15.000 users.

The key of success, as in any other business, was a well organized and accurate infrastructure. However, while revising the information system of the HS cable internet author realized that still there are certain issues and operator/user relationship problems needed to be revealed in order to achieve a greater level of service quality and also meet the consumer needs. Together with the technician team of the HS cable internet author tried to evaluate problem solving solutions by revising and improving the current information system.
In order of being able to recognize the lacks and potential improvement strategies for the HS cable net, author naturally first had to get an insight to the current information system. The

technicians at the HS cable net help desk guided me through the entire infrastructure , explaining me the purpose, services and tasks of the same. Author summarized the basic information about the current information system, visualizing the whole matter with a scheme of the originally implemented system.

After getting a clear overview of the main tasks, author was able to start with the problem recognition and the problem area detection. Further on the work deals with the segments in which problems were occurring, describing the nature of the detected problems. The gained information here enables us to evaluate problem detection criteria.

Beside the criteria for problem detection it was also necessary to define the real parameters based on which values the problems will be detected. The next step is the order issuing in sense of taking action after the problem detection. At this stage we introduce our problem solving solution, the new software application, describing its nature and purpose.

The last stage of the problem detection and prevention is the order issuing and printing part. In other words, in this phase orders are being issued and printed to be accomplished by technicians at the user addresses. All stages are visually supported by schemes and database screenshots, so the whole process could be understood more clearly.

Current information system description

(before implementing the problem solving software application)

The information system of the HS cable internet was originally purposed for information revision in order to create a service payment bill based on a contract. The services mentioned include cable TV, internet services via the HS cable TV infrastructure (cable internet) and digital television. When talking about these issues it is important to consider the following tasks:

- the registration of new users as well as the activation and de-activation of already existing users
- the creation of analytic user cards for service payment tracking
- the printing of bills
- oversight over the consumer's spending over a internet based access [2]

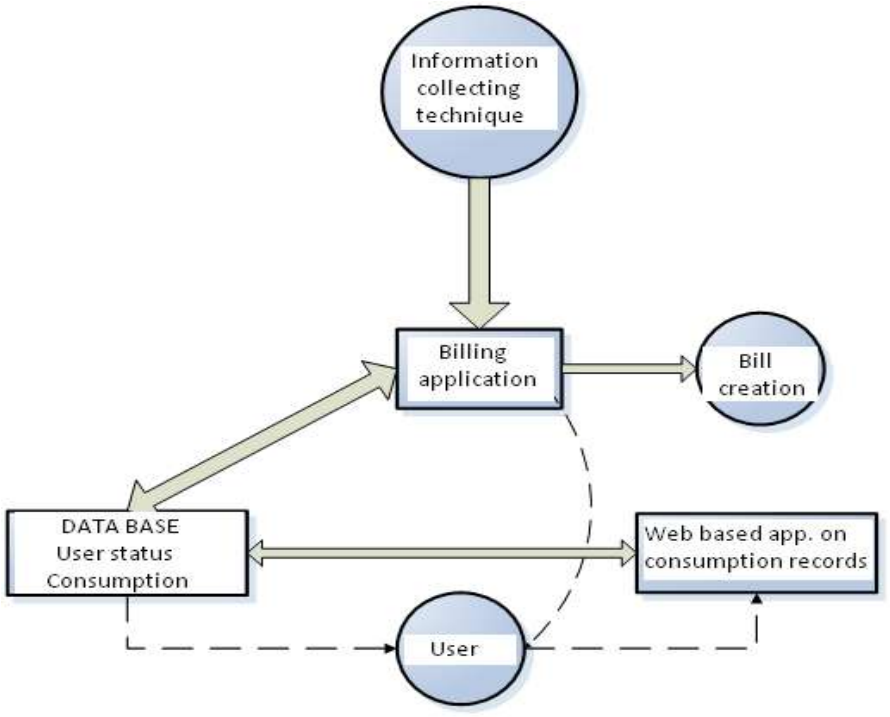


Figure 1. Scheme of the originally implemented information system

Problems with the old information system

Although the present HS cable internet information system was based on a good concept, still it was not efficient enough to deal with the problems that occurred over the time. Problems occurred in the following segments:

1. The records for ordered interventions concerning:

- Mistakes made while issuing the intervention orders:
    - Lacks in order records (insufficient information about users)
    - Delays with order issuing and interventions
    - The lost of orders caused by inobservance of technicians in charge

-Lack of information for the statistical processing:

- The missing of a database for storing the information about the intervention order issuing
- Order searching by predetermined criteria (time frame, user address etc.) was not possible

- Mistakes made during order returns

- Mistakes concerning records about the user and technician in charge

2. Vague information about end user link statistics

- The link statistics are conditioned by the signal quality
- Lack of records about present link statistics
- The need for preventive actions in order of improving service quality
- Report creation and problem identification at the net location/segment

All in all the problems with the current information systems reflected in a lack of segments for modem monitoring on the user side, in the hard realization of keeping statistic records about the number of accomplished interventions at a single user's account and the number of overall interventions and issued orders. Another difficulty was the impossibility of taking preventive actions in sense of modem monitoring in real time, based on which, potential problems could be identified and solved without causing the user any trouble with it.

Since the current information system did not have the necessary segments for the problem solving solution, improvement measures had to be evaluated.

The main focus was on the problem prevention and detection segment and also on the ordered intervention records. The whole problem solving idea was first visually sketched:

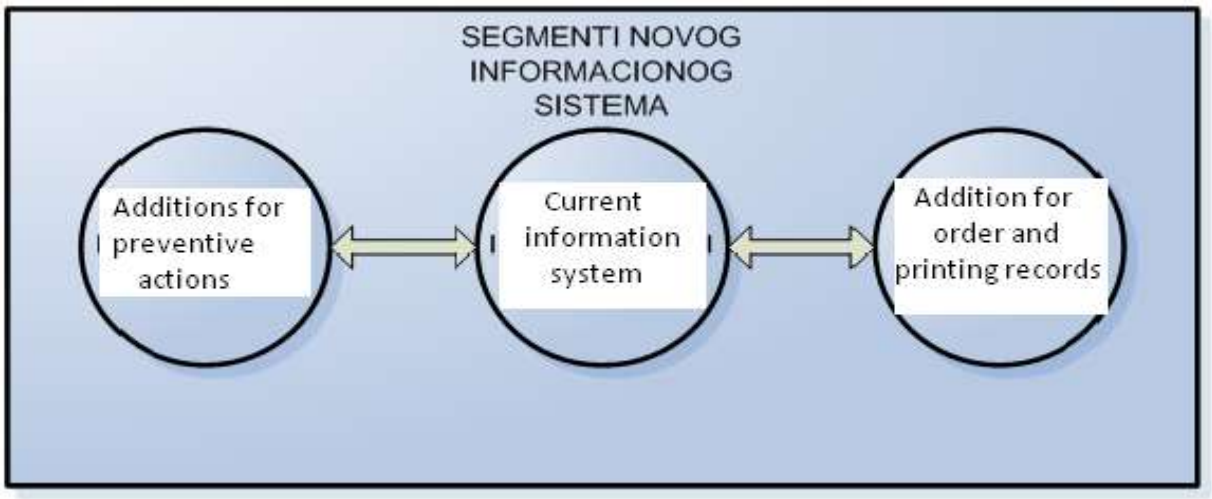


Figure 2. The problem-solving solution

Problem detection

Problems can be detected in two ways:

1. By a user reporting the problem
2. By an application for searching real parameters predetermined by a given criteria

To understand this it is first necessary to define the real parameters based on which values the potential problem will be detected.

The issuing of intervention orders

The procedure for issuing an intervention order is based on two principles:

1. Issuing of an order based on a problem report
2. Issuing of an order based on the application search results (following a predetermined criteria)

The issuing of an order based on a problem report

Obviously this type of order issuing is based on user reports. The necessary information is gathered based on the user requests at the help desk.

The issuing of an order based on the application search results

With the increase of HS cable internet users, the previously mentioned way of order issuing becomes more and more insufficient for enabling a high quality service. The reasons are as following:

1. The technicians are spending too much time on single user problems since they are not informed in detail about its nature.
2. The quality of the done work is not measurable
3. Actions for problem prevention are hard to enable

Because of these reasons it often came to great user dissatisfaction. Sometimes they had to wait up to 24h for problem/solving action. Since the number of users was growing rapidly from day to day, preventive actions had to be taken to keep a reasonable quality level of user satisfaction with the goal of keeping already existing users and also attracting potential users of the HS cable internet. This could be only done by improving the efficiency and speed of the technicians on site.

The order issuing using the application is done by 4 steps:

1. The application is gathering and storing the signal values both from the cable modems and also from the CMTS.
2. The database is being searched for modems which values are depart the regular ones.
3. The assignment of the problematic signal to the corresponding user.
4. Order printing including a detailed problem description and instructions for problem solving actions on court.

Before describing the application nature lets first take a look at the stages a modem has to pass for registering on the net, so the end user could access the internet. At the figure 3 the single steps are shown. [3]

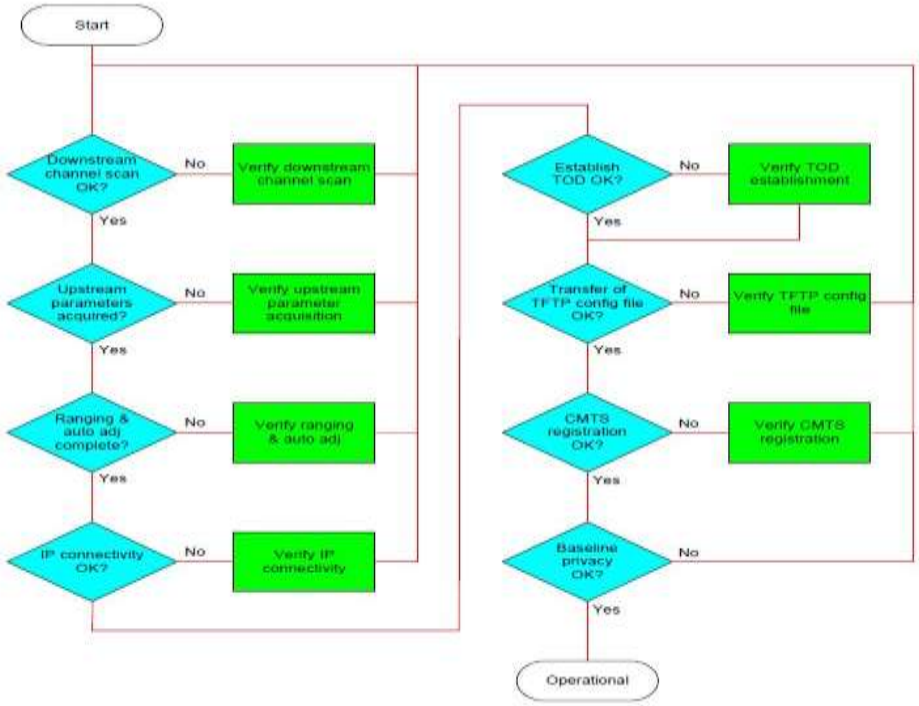


Figure 3. Registration stages [8]

The cable modem first has to be sinchronized to the downstream freaquency of the CMTS,after which the CMTS is sharing information to the cable modem hronologicaly, from the first to the last upstream until the modem sinchronizes to the one that is covering that area. At the next step the cable modem is sending a DHCP request which is being

delivered to the DHCP server. The server in return responds with an IP adress which will be used by the modem , and also with the IP adress of the TFTP server and the configuration file for the modem. After receiving the response of the DHCP server the cable modem is downloading the configuration file from the TFTP server.The last step is the verification,then the cable modem is ready for use.

Database review

Select all | Invert selection

Field name	Type	Allow nulls?	Key	Default value	Extras
cmID	bigint(21)	No	Primary	NULL	auto_increment
cmts	int(3) unsigned	Yes	Indexed	NULL	
MAC	varchar(20)	No	Indexed		
IP	varchar(15)	Yes	None	NULL	
US_ID	int(3) unsigned	Yes	None	NULL	
RxCMTS	int(3)	Yes	None	NULL	
CMstatus	int(2)	Yes	None	NULL	
CM_UPTIME	varchar(250)	Yes	None	NULL	
CM_DS_LEVEL	int(3)	Yes	None	NULL	
CM_US_LEVEL	int(3)	Yes	None	NULL	
CM_DS_SNR	int(3)	Yes	None	NULL	
CM_RF_RESETS	int(10) unsigned	Yes	None	NULL	
SIGQ_UNERROREDS	int(10) unsigned	Yes	None	NULL	
SIGQ_CORRECTEDS	int(10) unsigned	Yes	None	NULL	
SIGQ_UNCORRECTEDS	int(10) unsigned	Yes	None	NULL	
vnjeme	datetime	No	Indexed	0000-00-00 00:00:00	
active	enum('Y','N')	No	Indexed	Y	

Figure 4. Information about the user modem

Like already mentioned the application is storing the values to the database, in this case a MySQL database is being used. The database is reloading every 12 hours with new information which automatically become available for browsing over the web interface.

Figure 5.. Web interface for modem search

In the following example the option for showing all the modems that have the SNR value below 27dB is chosen, the result is shown at the picutre below:

CM Review Database

br.	UserName	UPTIME	DS_CH_ID	US_CH_ID	DS_PW	US_PW	DS_SNR	RF_RESETS	bez errora	korigovano	greske	MAC	vrijeme
1	memic.en	(159476100) 18 days, 10:59:21.00	2	2	7.4	47.5	26.6	20	4204905395	350	0	0:1c:ea:7d:ff:12	2009-08-27 06:15:47
2	admir87	(1783400) 4:57:14.00	2	1	0.5	44.3	24.4	0	183955447	163	2	0:22:3a:ff:47:d3	2009-08-27 03:49:42
3	arcica	(7641300) 21:13:33.00	2	1	6.8	37.3	22.2	0	1412424080	51	91	0:1e:6b:25:0d:da	2009-08-27 06:40:07
4	m.tankovic	(20850200) 2 days, 9:55:02.00	2	8	2.7	49.4	26.6	2	3877800871	206	0	0:1e:6b:26:a8:4	2009-08-27 06:45:38
5	dedagic.s	(23719500) 2 days, 17:53:15.00	2	8	6.2	48.2	26.8	2	259556396	269	2	0:1e:6b:26:5E26	2009-08-27 06:38:48
6	bjedic42	(40146900) 4 days, 15:31:09.00	2	2	4	49	26.8	1	3885278844	363	0	0:14:e8:ac:b5:8e	2009-08-27 04:24:17
7	adnan.po	(3925900) 10:54:19.00	2	10	0.1	39.2	26.9	0	904213563	133	0	0:1a:ad:71:15:6	2009-08-27 05:49:14
8	a.rakovic	(128281900) 14 days, 20:20:19.00	2	8	-11.4	49.7	24.2	61	797512136	1024	0	0:1e:6b:73:7e:d4	2009-08-27 07:28:10
9	hnumic	(3538600) 9:49:46.00	2	9	-11.9	52.9	26.2	0	896429636	0	0	0:14:e8:ac:bd:26	2009-08-27 02:37:47
10	94.sabanovic	(5203500) 14:27:15.00	3	2	-23.9	59	25.8	0	1129596733	3	0	0:22:3a:d6:f5:13	2009-08-27 08:05:15
11	r.humackic	(15728700) 1 day, 19:41:27.00	3	2	-23.8	57.8	24.5	1821	1638507543	143	0	0:1e:6b:25:8f:b0	2009-08-27 06:52:43

Figure 6. List of modems given by a predetermined criteria

From the gathered results we can clearly see that all the modems that have their SNR value below 27dB have working problems. We can also evalute this from the number of lost RF connections with the CMTS,number of errors during package transfers (both,debugged and those that could not have been debugged).

The information gathered from the cable modem need to be associated to the already existing billing application where the user information is stored. The association is being done through the cable modem MAC adress , which is automatically being stored at the billing application when the user registers [6]. Other information being also stored are shown below :

Select all | Invert selection

Field name	Type	Allow nulls?	Key	Default value	Extras
id	int(4)	No	Primary	NULL	auto_increment
username	varchar(30)	Yes	None	0	
mac	varchar(32)	Yes	None	NULL	
ime	varchar(40)	No	None		
active	enum('Y','N')	No	None	Y	
net	enum('HS','ELOB','CABLENET','ELOB-KB','ELOB-MD','ELOB-OTOKA','CHS')	No	None	HS	
paket	varchar(20)	Yes	None	NULL	
emailadresa	varchar(45)	Yes	None		
adresa	varchar(100)	Yes	None	NULL	
telefon	varchar(50)	Yes	None	NULL	
ugovor	varchar(50)	Yes	None	NULL	
datum	varchar(10)	Yes	None	NULL	
IDulice	bigint(5) unsigned	Yes	None	NULL	

Figure 7. User information

How these information look like for some existing users is shown below :

Select all | Invert selection

id	username	mac	ime	active	net	paket	emailadresa	adresa	telefon	ugovor	datum	IDulice
9928	marci	0:18:c0:25:46:3c	DEMIRA PAĐALIĆ	N	CHS	HS1		TRG HEROJA -32 -136 -	061/415-007	5469		554
9927	eldina309	0:18:c0:25:5:76	JASNA LIGATA	Y	CHS	HSeconomic		HUMSKA -309 –	033/653-482	5468		79
9926	ouad7	0:18:c0:24:cd:da	ELVIR MURFIC	Y	CHS	HSeconomic		MUHAMEDA EF. PANDZE -221 –	061/491-224	5467		150
9925	tumbul	0:18:c0:24:ac:aa	ADIS TUMBUL	N	CHS	HS1		STARA CESTA -48 –	062/436-510	5466		283
9924	muamerb	0:18:c0:24:9b:7e	MUAMER BANDIC	N	CHS	HS1		GORNJI VELEDICI -86 –	061/959-039	5465		155
9923	samrab	0:18:c0:24:d4:c2	SAMRA BAĐIC	N	CHS	HS2		TRG HEROJA -32 -1 -	062/105-378	5464		554
9922	muratm	0:14:a8:a1:d7:4e	MURAT MURATOVIC	Y	CHS	HS2		ENVERA ĐEHOVICA -48 -8 -	061/143-669	5463		55
9915	curics	0:18:c0:24:9c:76	SAFET CURIC (BACIROVIC ISMETA)	Y	CHS	HS1		NEDIMA FILIPOVICA -4 -2 -6A	062/130-150	5458		32
9914	mvedran	0:18:c0:25:3a:0	VEDRAN MRKONJIC	Y	CHS	HS2		EMERIKA BLUMA -34 -4 -	061/102-248	5457		31
9913	alend	0:18:c0:15:b:32	ALEN DELALIC	N	CHS	HS2		DR JUSUFA TANOVICA -18 –	061/204-933	5456		184
9912	vedovex	0:18:c0:25:ac:20	MUHIDIN MUHAREMOVIC	Y	CHS	HS1		HAMDIJE CEMERLIĆA -16 -2 -	033/643-303	5455		167
9911	ifetab	0:18:c0:25:3:d6	IFETA BRANKOVIC	Y	CHS	HS1		ALEJA LIPA -57 -4 -	033 645977	5454		11
9910	curicm	0:18:c0:24:8f:6	MUAMER CURIC	Y	CHS	full2		PORODICE RIBAR -8 -6 -	061/716-095	5453		27
9909	samirak	0:18:c0:24:c6:4	SAMIRA KUSTURA	Y	CHS	HS3		GRADACACKA -122 -1 -	061/935-839	5452		24
9916	fanisc	0:18:c0:25:45:f0	ISMAIL COSOVIC	Y	CHS	HS2		AZIZE ĐACIRBEGOVIC -122 -18 -	659-420, 061/320-345	5451		29
9918	mlemezan	0:18:c0:24:c5:f4	MUNEVERA LEMEZAN	Y	CHS	HSeconomic		GRADACACKA -110 -2 -	061/487-421	5459		24
19634	m.kurtovic	0:1e:6b:26:bf:bc	KURTOVIĆ MAIDA	Y	CHS	HSeconomic		ZAIMA ĐARCA -36 -3 -	061 170996	13829		46
9904	fatic	0:18:c0:25:72:4	ĐABAN SACIC	Y	CHS	HSeconomic		ALBERTA FORTISA -32 –	033/446-475	5448		473

Figure 8. Various user information

The information important for us are the user name, adress and phone number. Additional to these information , the signal value is being enrolled at the order that the technician takes over.

The tracking of the technician's work is enabled by using the application for the real time information download from the modem . The application is developed in the C++programing language, using SNMP (Simpe Network Management Protocol) for information gathering from a cable modem in a given interval, in our case - every second. This application enables us keeping record about our technicians work on site, having also a clear picture of the results of his work.

The aim of this measure is that the signal correction is being made without the intervention of the user.In some cases the user doesn't even notice some interventions.

Figure 9 Real time modem monitoring [9]

This way preventive actions are being taken even before it comes to the case that a signal problem occures which leads to modem work difficulties. The technician comes on site and takes the signal to an optimal level. That way great user satisfaction is achieved- the problem is prevented on time, there is no need for the user to call our help desk and to wait for actions to be taken

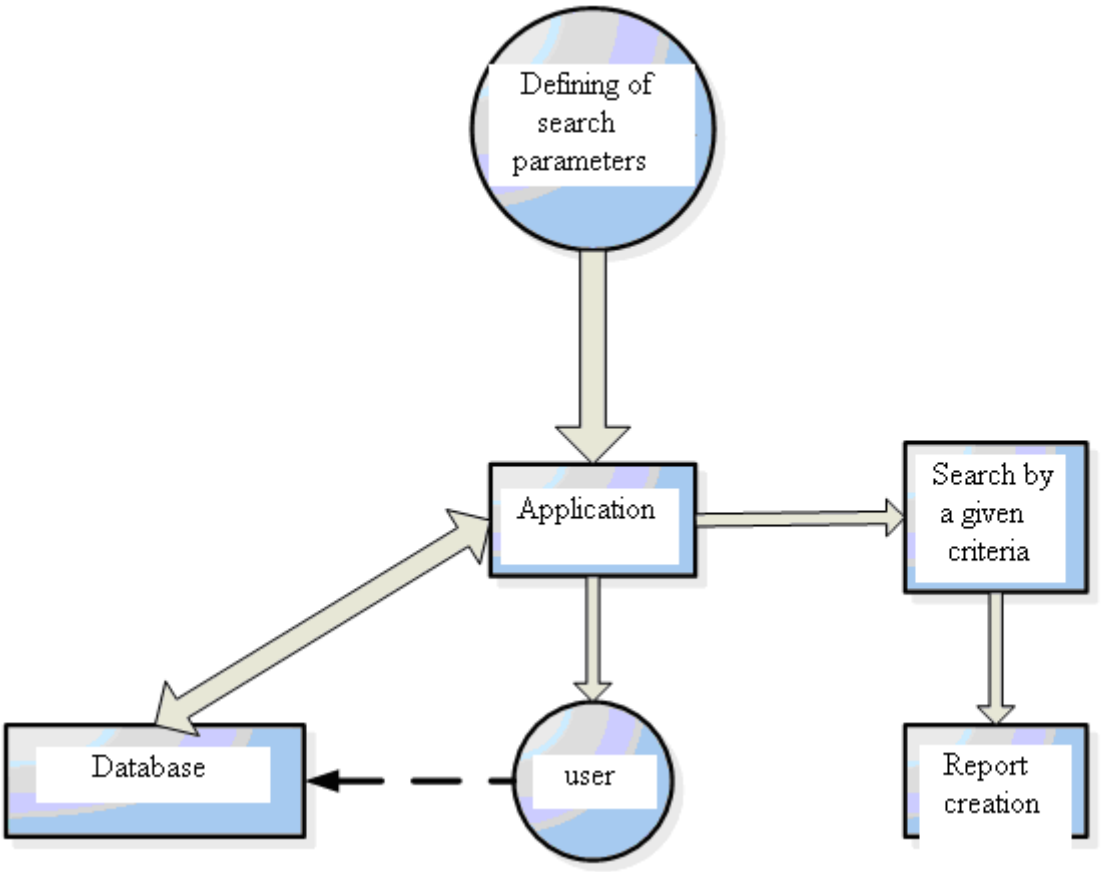


Figure 10 Improved search information system segment

Using the database as an information source for keeping records about the cable modem condition, it is possible to have a clear vision about the activities needed to be processed in order of improving the system work. In figure 10 we can see the visualized relationship and principe of work of the information system segments so the work principle could be understood. [7]

The procedure of issuing the intervention orders

Beside the detection and prevention segment of the improved HS cable net information system, the order record application is also a very important part of the new management system. This application is first of all extremely user friendly thanks to a clear and simple structure. The picture below shows the opening part of the application.

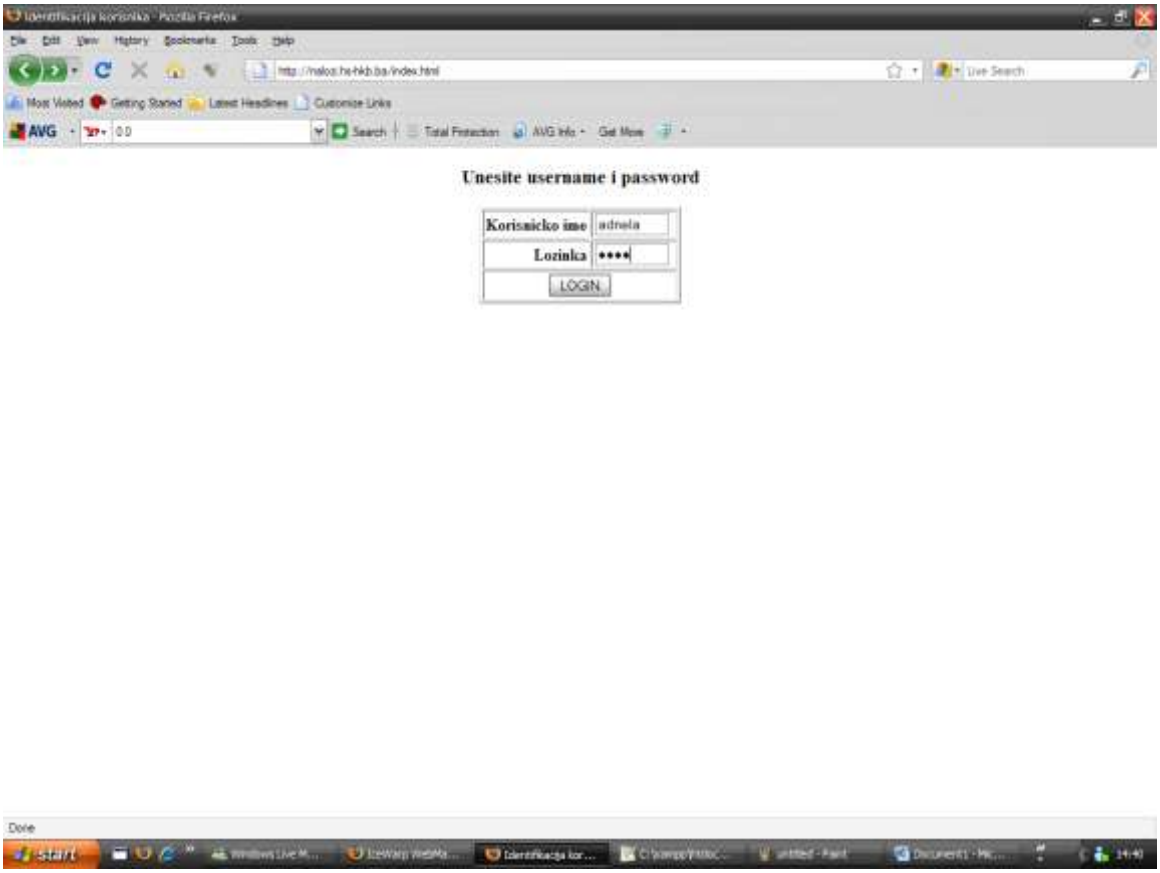


Figure 11 Opening part of application

First of all, the authorized person has to enter his/her username and password, in order of ensuring a reasonable security level. This level can be increased by importing more parameter requests like IP adress etc.

The entry of a new intervention order requires a large set of information about the single user and the problem type (example : adress,name and surname, phone number, problem description and other additional information that are relevant for the intervention on court. (picture 2). Also, it is important to specify the technician who obliges and issues the order.

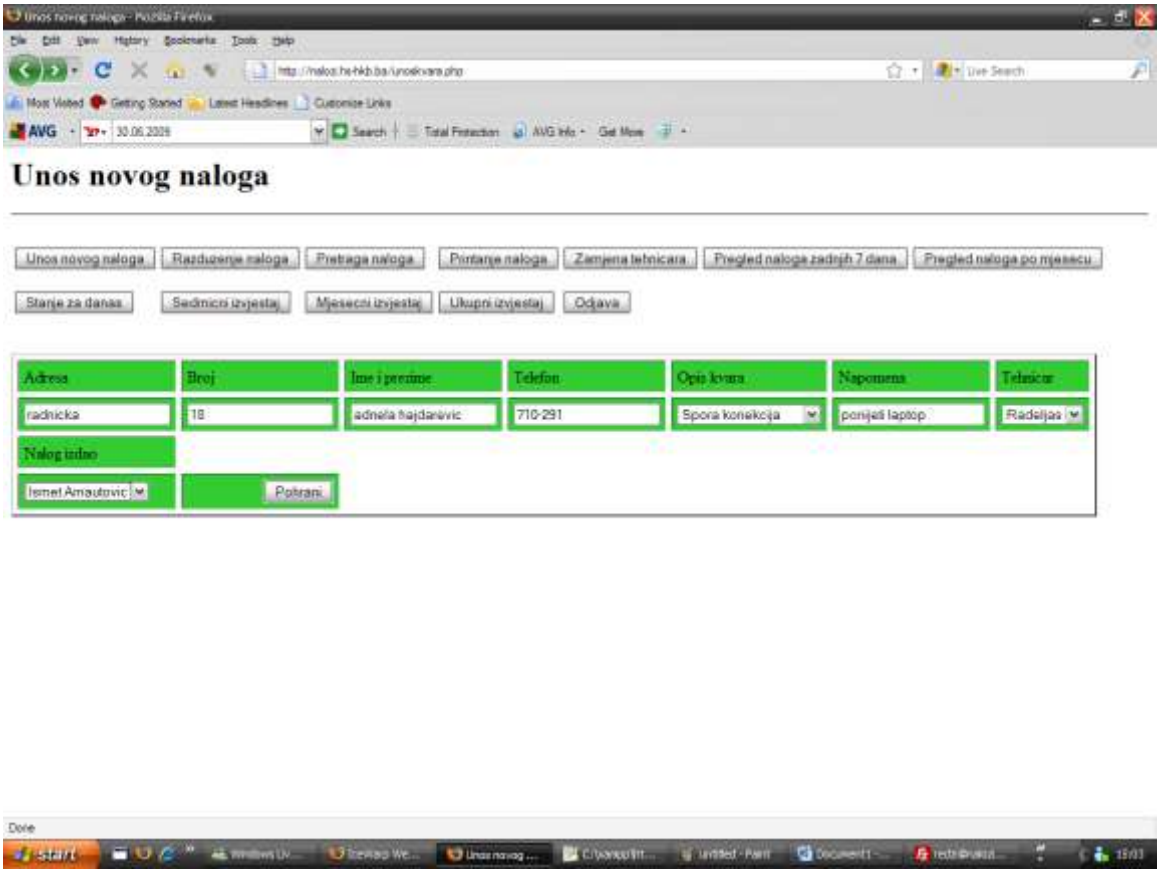


Figure 12 The entry of new orders

The figures 11 and 12 in detail show the order issuing procedure, listing all obliged orders and also user information. In practice it came out as very usefull having an insight to these information, especially in situations when interventions are not being fullfiled (no matter what reason). In that case we can exactly see who and when issued/obliged the order and why it has not been accomplished.

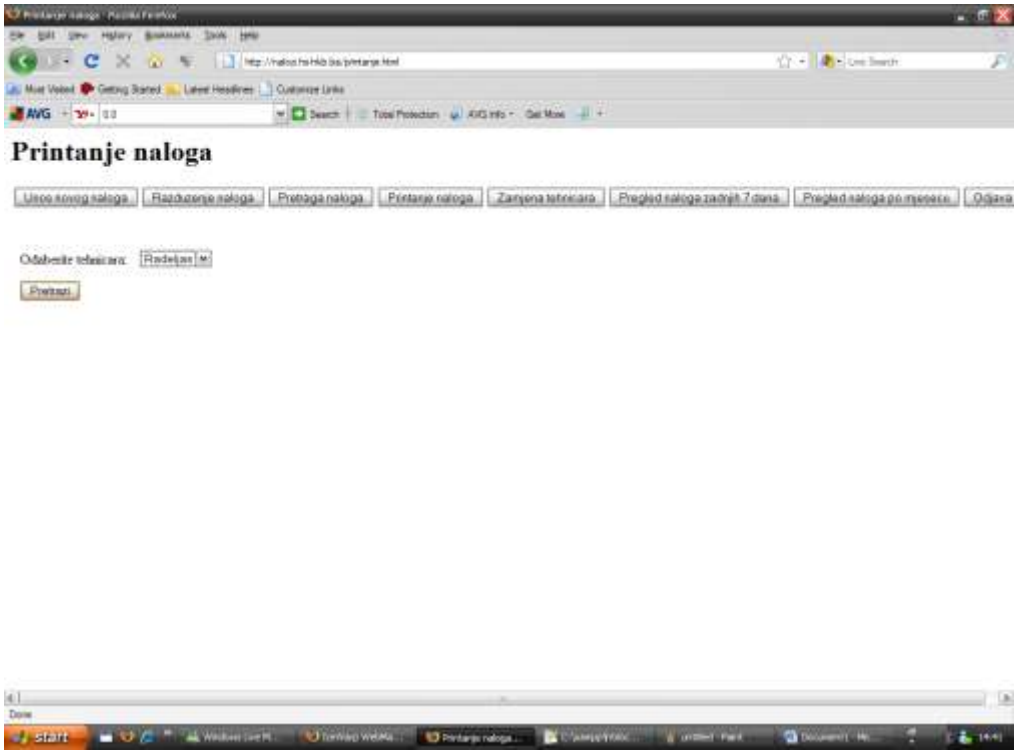


Figure 13 Order printing

The picture above shows the next step – the printing of issued orders.

The day to day business procedure includes order issuing with the aim of enabling high quality sevice,on time, defined by the operator/user contract.

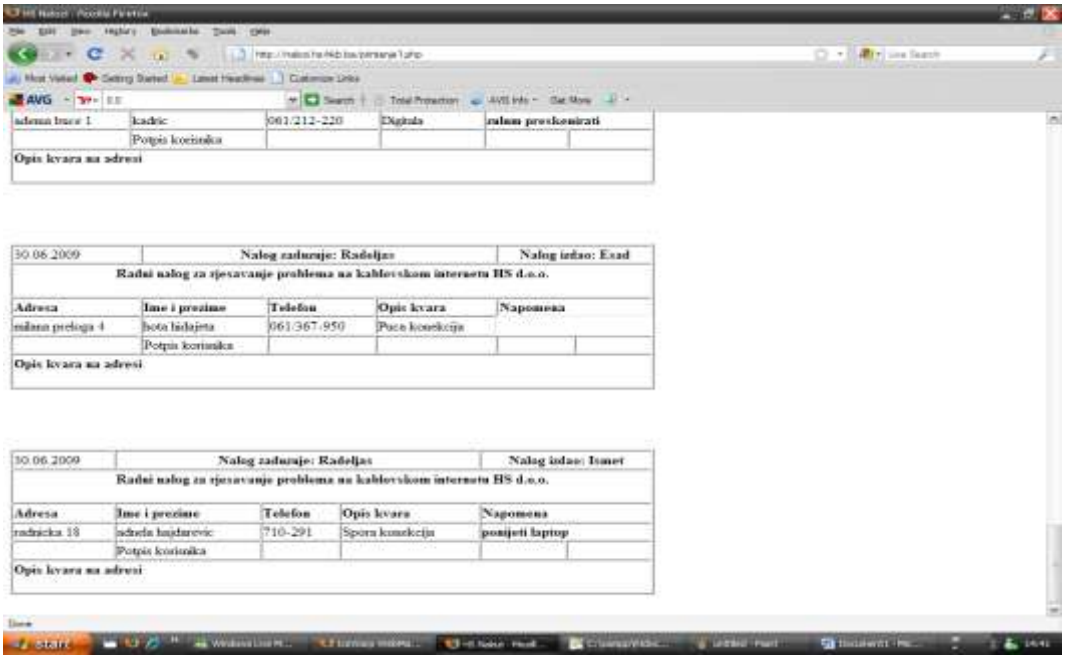


Figure 14 Detailed list of entered intervention orders

After accomplishing the intervention on court, the orders previously issued to the technicians in charge, are being returned. Once again we can see the benefits of such an organization inside the information system management (figures 15 , 16).

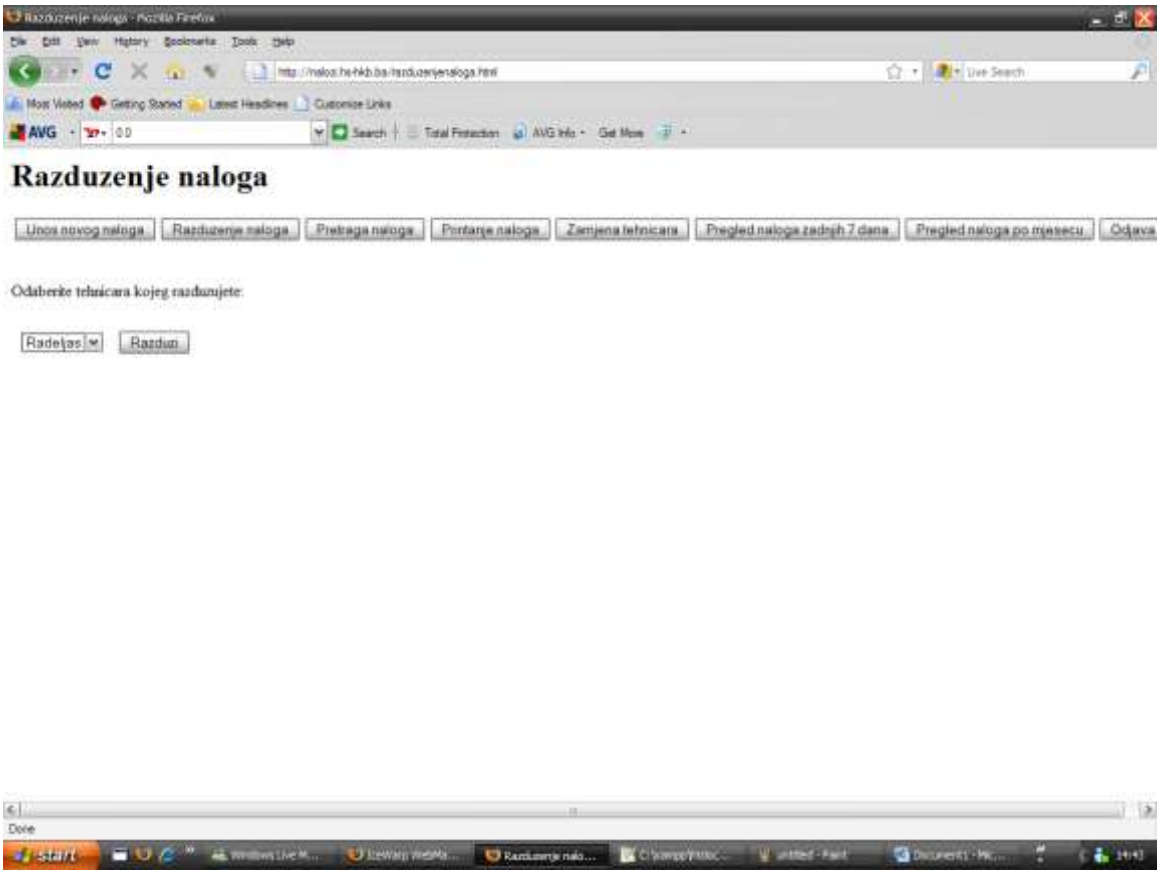


Figure 15 Procedure of order return

The order return clearly shows the present status of the issued intervention also including the technician statements. This all leads to a clear definition of reposnsibilities, either single or work teams in charge.

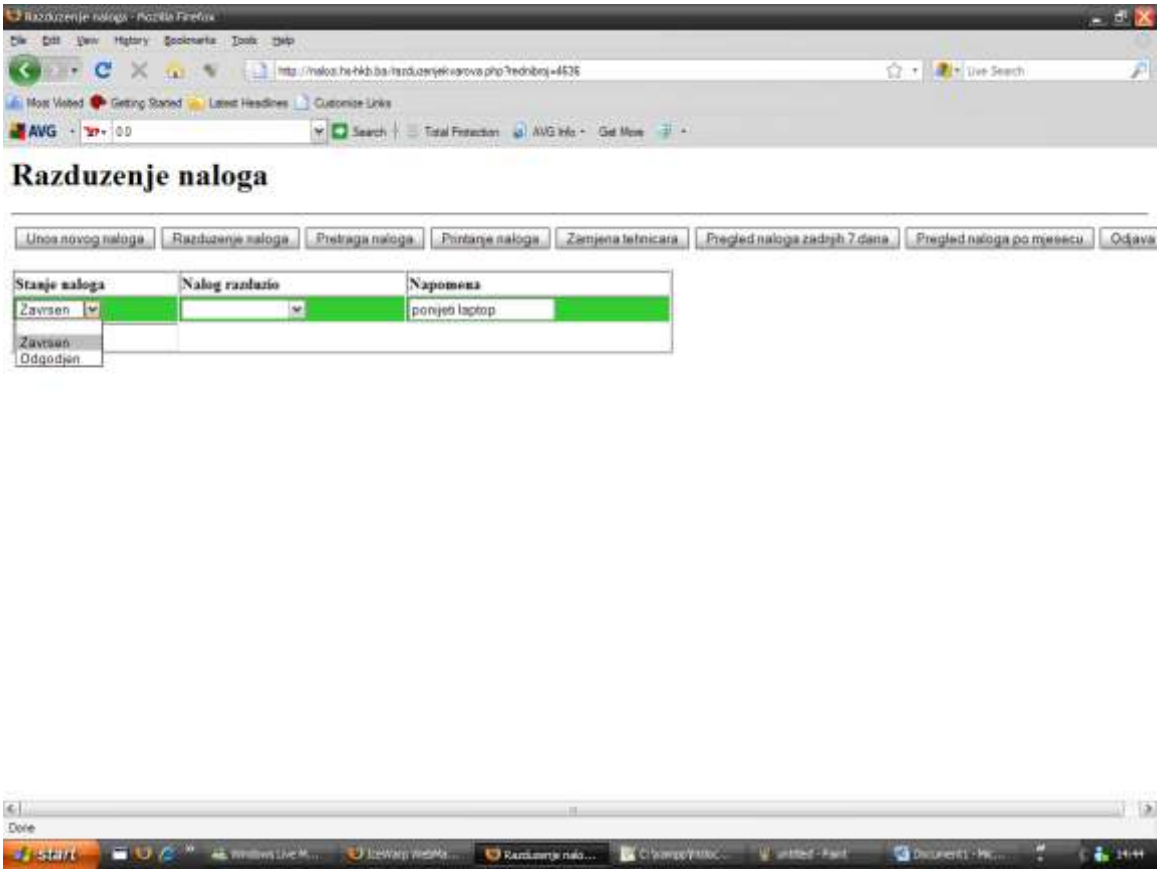


Figure 16 Procedure of order return (continued)

In case the intervention order status needs to be checked, this application enables searching tasks by various criteria (name and surname,adress etc.). The order status is checkable at any time from its issuing, showing all the changes and actions that have been made under some given circumstances (figure 16). Since the order takeover and return dates are also evidented, this is also a criteria for measuring the efficiency of technicians on site.

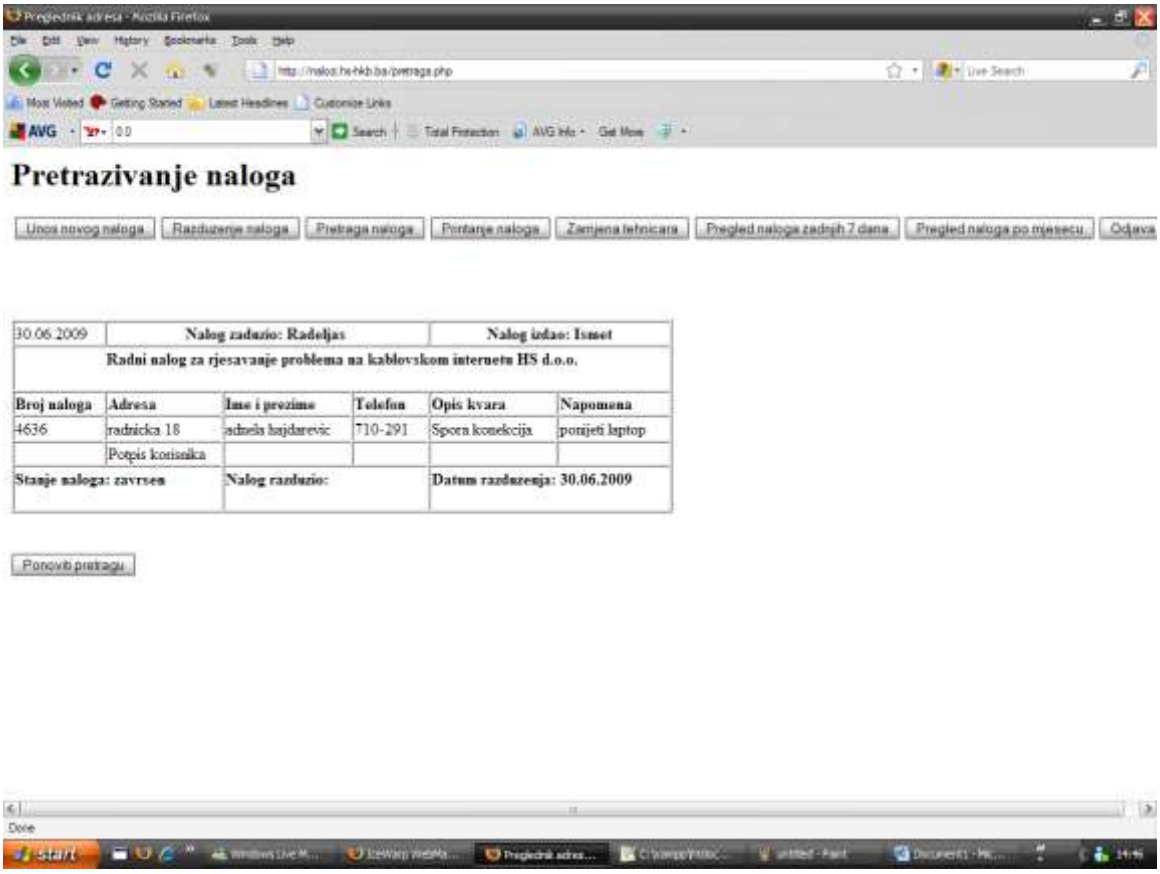
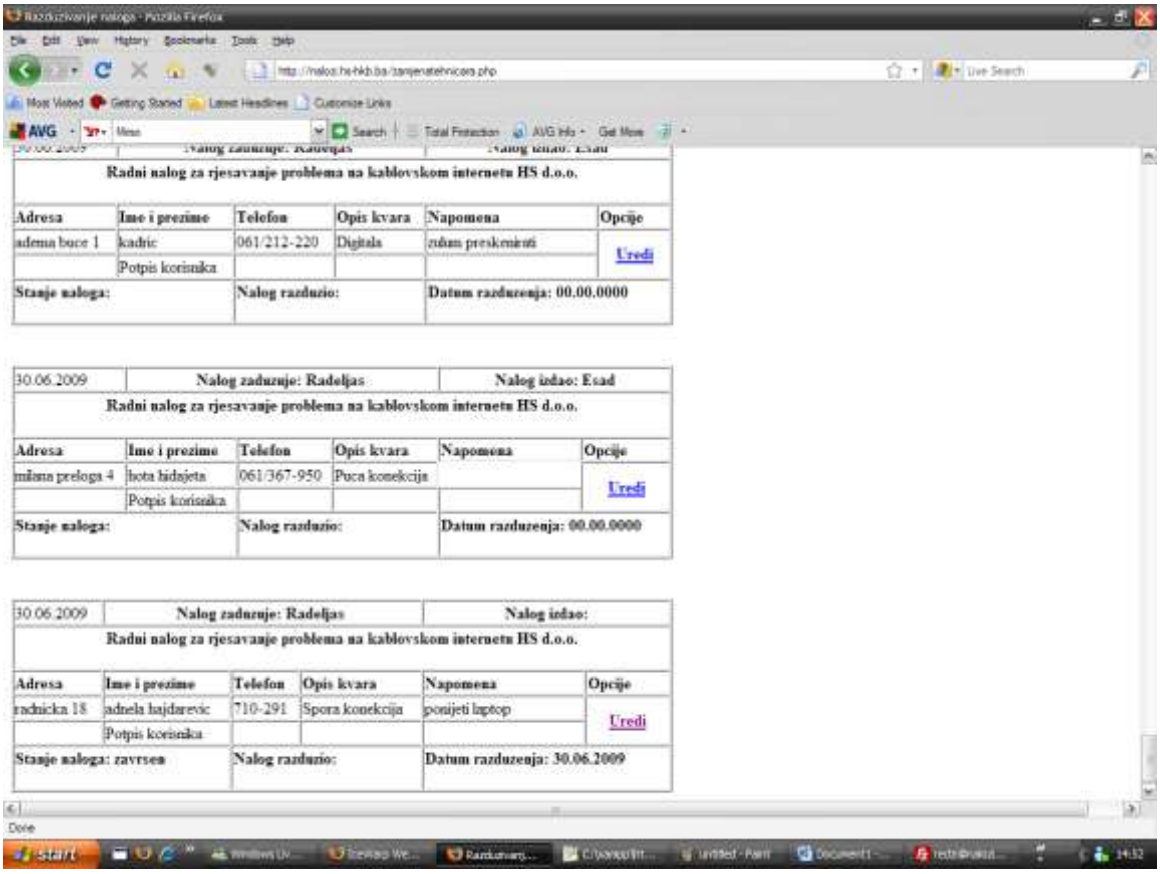


Figure 16b Order search by a given criteria

In case information editing is neccessary at an already defined order prescription, the procedure is easily implemented. First of all the editing candidates are selected .

After that the technician in charge is selected, keeping records of the authorized person who is editing the order. This is very important for having an insight to the changes being made by the responsible technician, so every step is justified at the later revision.

The goal of these measures is to eliminated every form of irresponsibility and indolence at work, so our operator/user relationship could remain on a high level of satifsaction.



Radni nalog za rjesavanje problema na kablovskom internetu HS d.o.o.

Adresa	Ime i prezime	Telefon	Opis kvara	Napomena	Opcije
adema buce 1	kadric	061/212-220	Digitala	zidam preskeminti	Uredi
	Potpis korisnika				
Stanje naloga:		**Nalog razduzio:**		**Datum razduzenja: 00.00.0000**	

30.06.2009	Nalog zaduzuje: Radeljas	Nalog izdao: Esad

Radni nalog za rjesavanje problema na kablovskom internetu HS d.o.o.

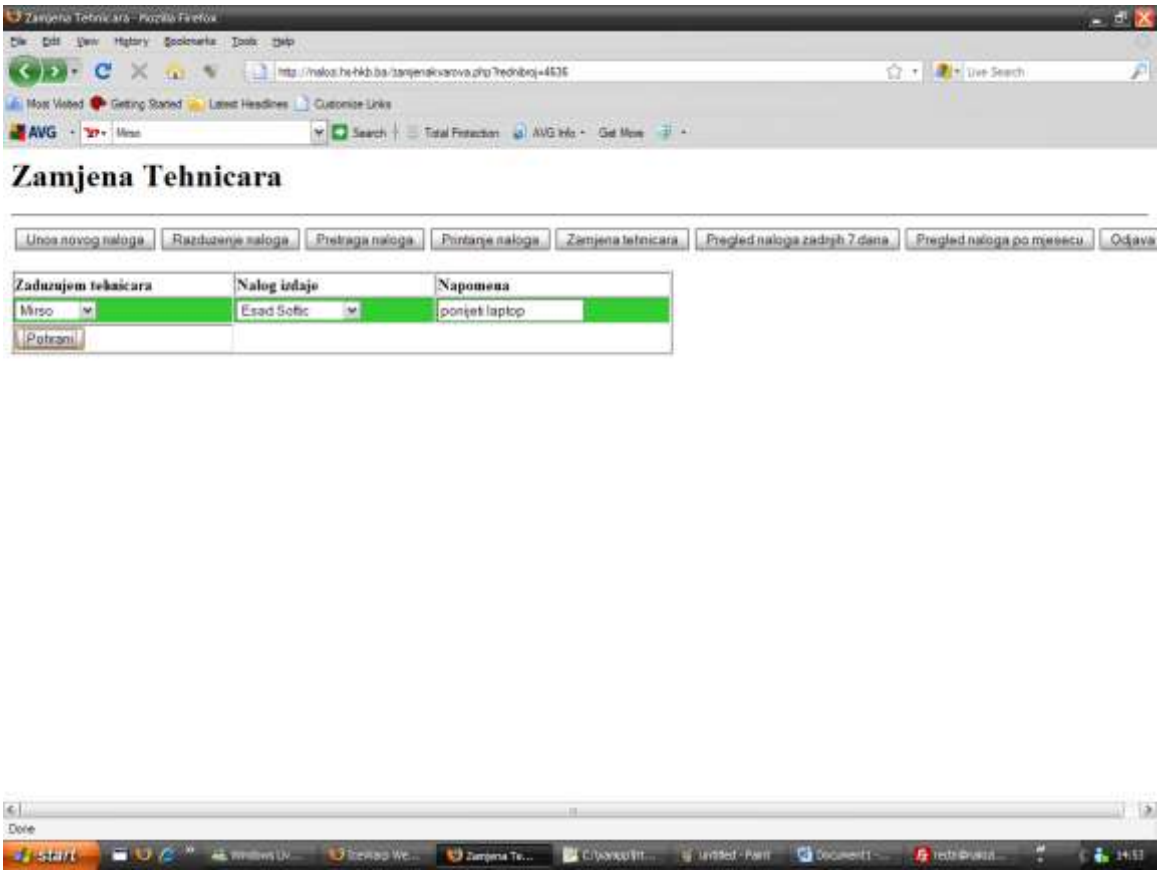
Adresa	Ime i prezime	Telefon	Opis kvara	Napomena	Opcije
milana preloga 4	hota hidajeta	061/367-950	Puca konekcija		Uredi
	Potpis korisnika				
Stanje naloga:		**Nalog razduzio:**		**Datum razduzenja: 00.00.0000**	

30.06.2009	Nalog zaduzuje: Radeljas	Nalog izdao:

Radni nalog za rjesavanje problema na kablovskom internetu HS d.o.o.

Adresa	Ime i prezime	Telefon	Opis kvara	Napomena	Opcije
radnicka 18	adnela hajdarevic	710-291	Spora konekcija	ponijeti laptop	Uredi
	Potpis korisnika				
Stanje naloga: zavrsen		**Nalog razduzio:**		**Datum razduzenja: 30.06.2009**	

Figure 17 Selecting the order we want to edit



Zamjena Tehnicara

Unos novog naloga | Razduzenje naloga | Pretraga naloga | Printanje naloga | Zamjena tehnicara | Pregled naloga zadnjih 7 dana | Pregled naloga po mjesecu | Odjava

Zaduzujem tehnicara	Nalog izdajo	Napomena
Mirso	Esad Softic	ponijeti laptop
Potvrdi		

Figure 18 Procedure of editing the entered order / Technician change

This application also enables the creation and insight to statistic parameter reports based on the number of issued intervention orders. There are many possibilities for defining the type and purpose of the report, creating weekly report based orders, where one can clearly see the list of issued orders made in the last 7 days.

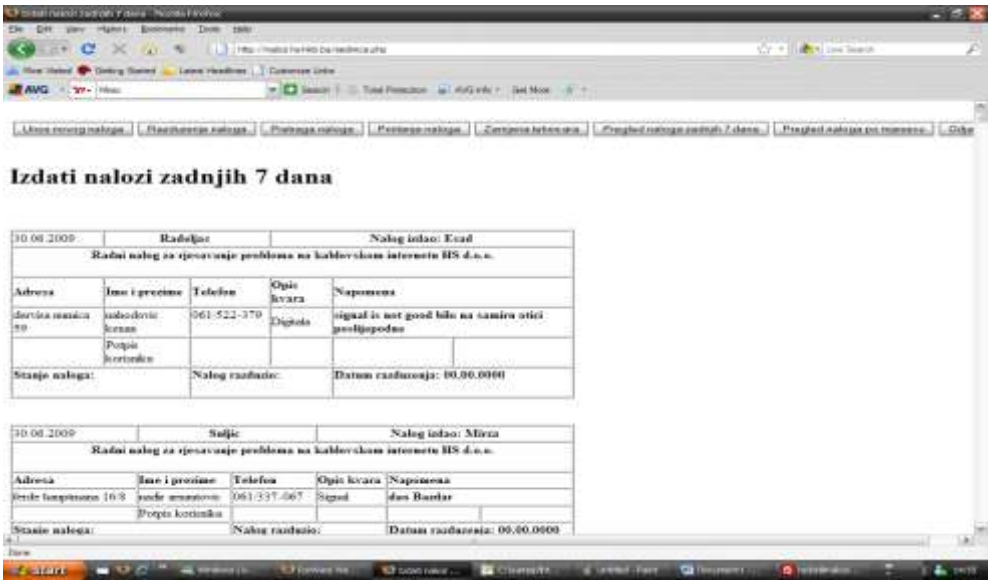
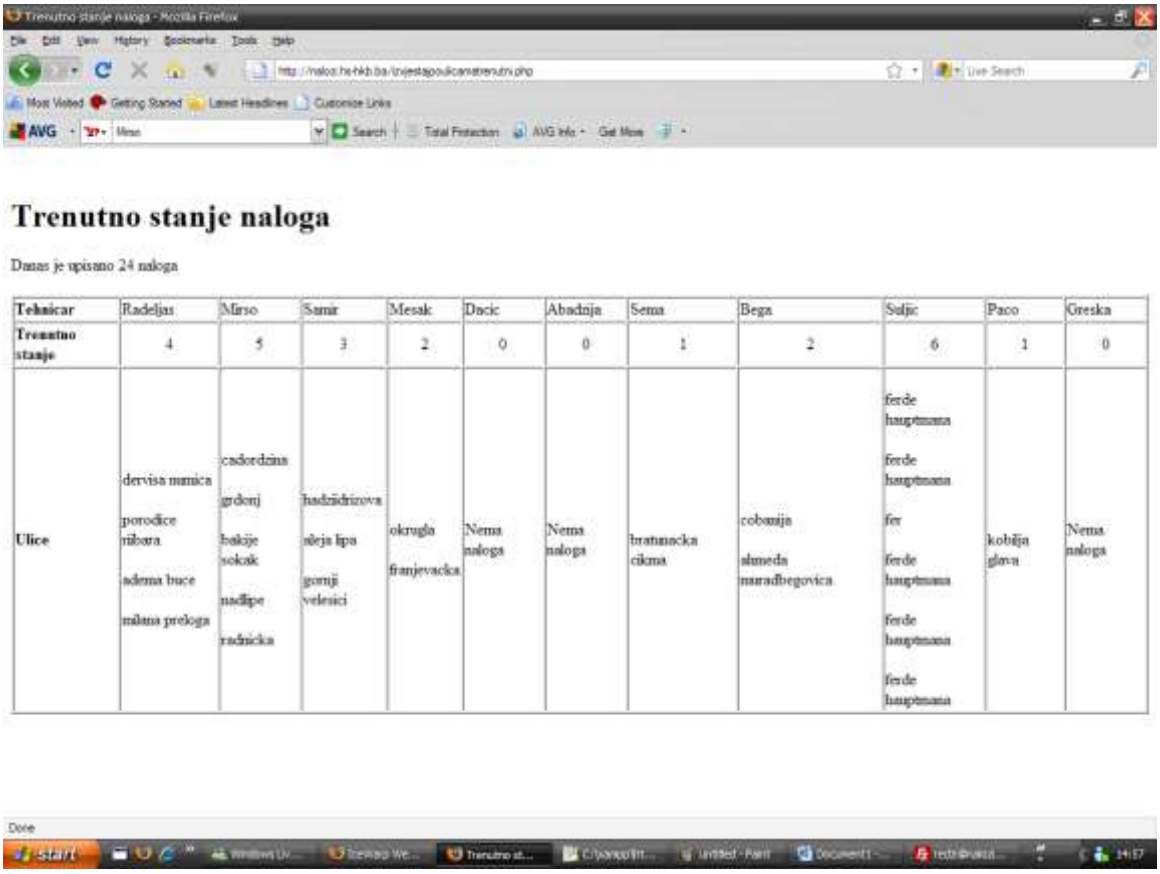


Figure 19 Searching the orders of the last week

Also you have the opportunity to create a report based on a monthly level

Figure 20 Search by months

Another possible opportunity is to create an issued intervention order report based on the technicians in site,their number of orders and adresses taken or on the net segment for which the intervention is required .



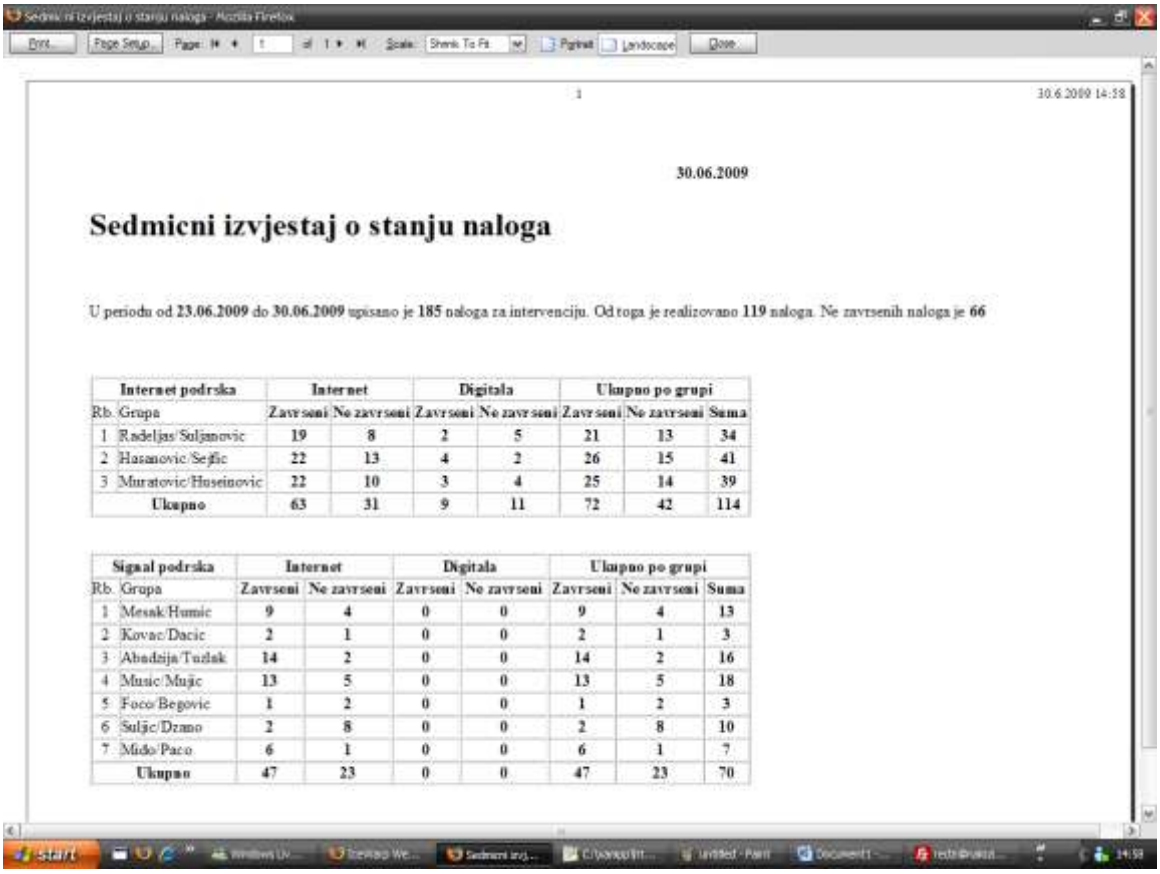
Trenutno stanje naloga

Danas je upisano 24 naloga

Tehnicar	Radeljas	Mirso	Samir	Mesak	Dacic	Abadnja	Sema	Bega	Suljic	Paco	Greska
Trenutno stanje	4	5	3	2	0	0	1	2	6	1	0
Ulice	dervisa numica porodice ribara adema buce mlaua preloga	cadordzina grdonj bakije sokak nadlipe radnicka	hadzidrizova sleja lipa gornji velesici	okrugla franjevacka	Nema naloga	Nema naloga	bratunacka cikma	cobanija slumeda nuradbegovica	ferde hauptmana ferde hauptmana fer ferde hauptmana ferde hauptmana ferde hauptmana	kobilja glava	Nema naloga

Figure 21 Current records of issued order interventions

The weekly report can also be considered as an insight to the technicians efficiency on site . This way we create a clear picture about the engagement of the technicians and about eventually lacks when talking about work responsabilities.



30.06.2009

Sedmicni izvjestaj o stanju naloga

U periodu od **23.06.2009** do **30.06.2009** upisano je **185** naloga za intervenciju. Od toga je realizovano **119** naloga. Ne zavrsenih naloga je **66**

Internet podrska		Internet		Digitala		Ukupno po grupi		
Rb.	Grupa	Zavrseni	Ne zavrseni	Zavrseni	Ne zavrseni	Zavrseni	Ne zavrseni	Suma
1	Radeljas/Suljanovic	19	8	2	5	21	13	34
2	Hasanovic/Sejfic	22	13	4	2	26	15	41
3	Muratovic/Huseinovic	22	10	3	4	25	14	39
	Ukupno	63	31	9	11	72	42	114

Signal podrska		Internet		Digitala		Ukupno po grupi		
Rb.	Grupa	Zavrseni	Ne zavrseni	Zavrseni	Ne zavrseni	Zavrseni	Ne zavrseni	Suma
1	Mesak/Humic	9	4	0	0	9	4	13
2	Kovac/Dacic	2	1	0	0	2	1	3
3	Abadzija/Tuzlak	14	2	0	0	14	2	16
4	Music/Mujic	13	5	0	0	13	5	18
5	Foco/Begovic	1	2	0	0	1	2	3
6	Suljc/Dzano	2	8	0	0	2	8	10
7	Mido/Paco	6	1	0	0	6	1	7
	Ukupno	47	23	0	0	47	23	70

Figure 22 Order records of the last week

The above mentioned report can also be created as a year report shown at the picture below:

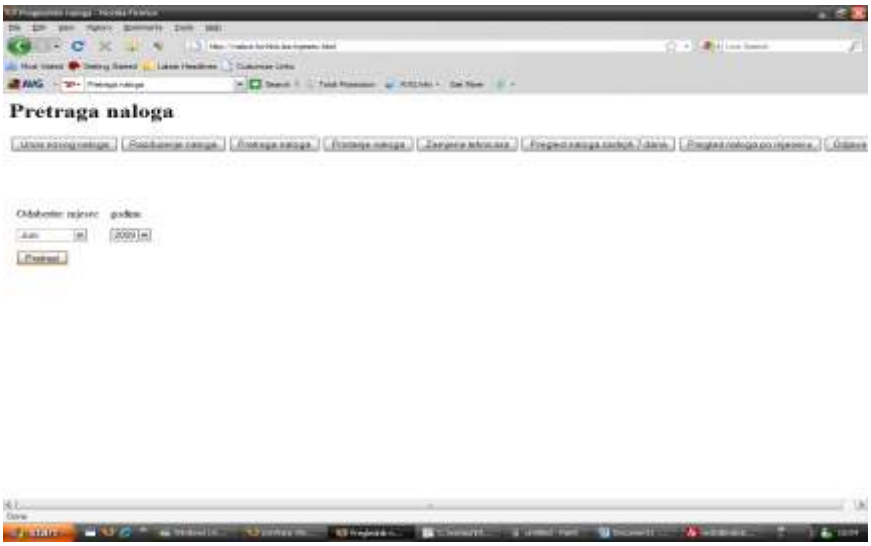
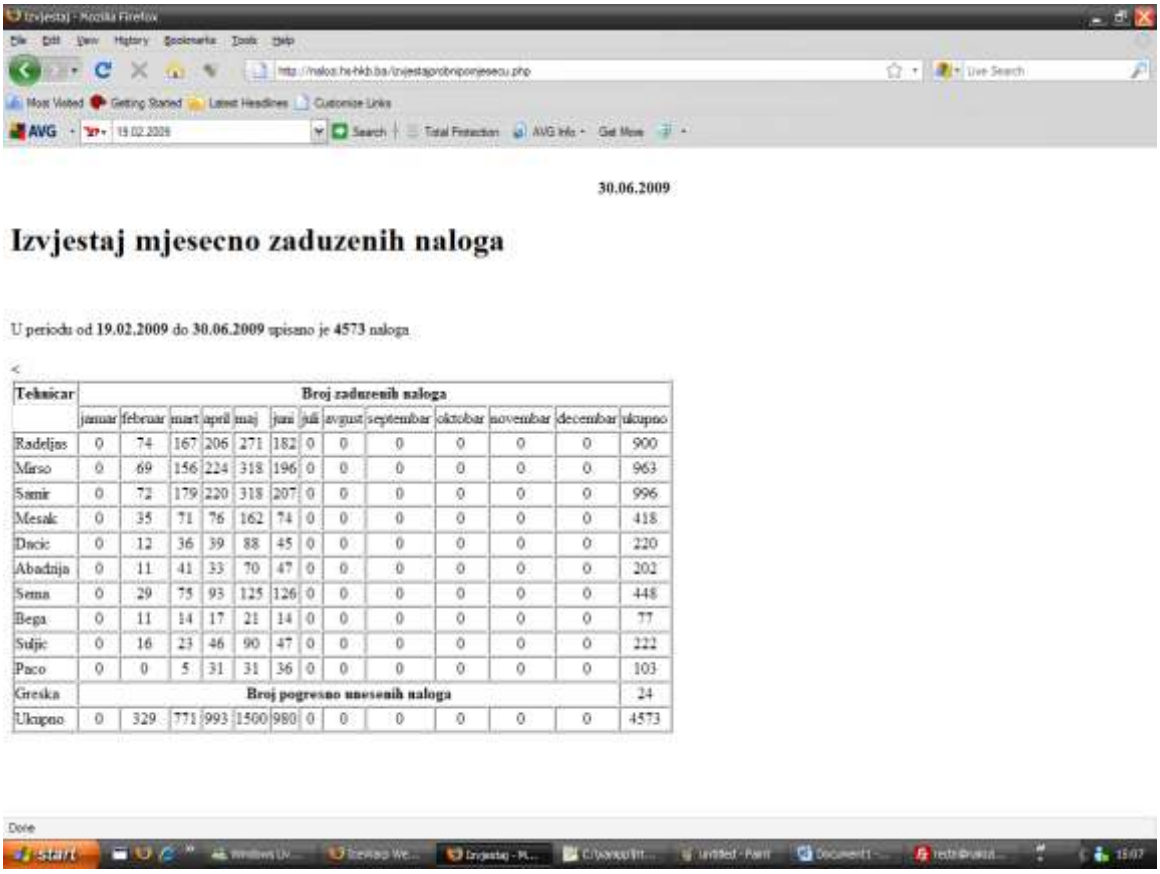


Figure 23 Report for a selected year [5]



30.06.2009

Izvjestaj mjesecno zaduzenih naloga

U periodu od **19.02.2009** do **30.06.2009** upisano je **4573** naloga

<

Tehnicar	Broj zaduzenih naloga												
	januar	februar	mart	april	maj	juni	juli	avgust	septembar	oktobar	novembar	decembar	ukupno
Radeljas	0	74	167	206	271	182	0	0	0	0	0	0	900
Mirso	0	69	156	224	318	196	0	0	0	0	0	0	963
Samir	0	72	179	220	318	207	0	0	0	0	0	0	996
Mesak	0	35	71	76	162	74	0	0	0	0	0	0	418
Dacic	0	12	36	39	88	45	0	0	0	0	0	0	220
Abadzija	0	11	41	33	70	47	0	0	0	0	0	0	202
Sema	0	29	75	93	125	126	0	0	0	0	0	0	448
Bega	0	11	14	17	21	14	0	0	0	0	0	0	77
Suljic	0	16	23	46	90	47	0	0	0	0	0	0	222
Paco	0	0	5	31	31	36	0	0	0	0	0	0	103
Greska	Broj pogresno unesenih naloga												24
Ukupno	0	329	771	993	1560	980	0	0	0	0	0	0	4573

Figure 24 Order records for a given year (per months)

Finally, it is important to present an exact description of the above mentioned information system segment. The picture below shows the cleary defined relationships and principles of work picture. For a complete understanding of the matter you also need to involve the steps in application use which author defined above.

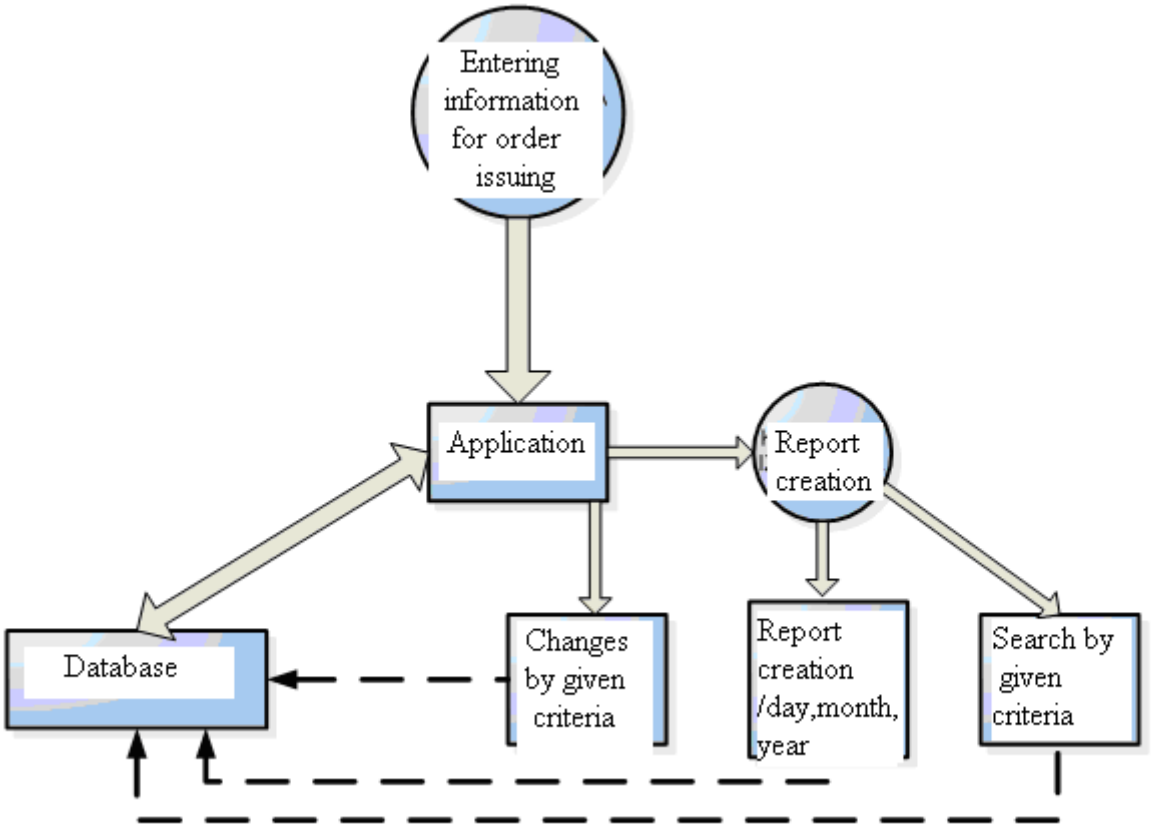


Figure 25 Scheme of information system segments

After entering the information for the order issuing via the application, we store all the mentioned information into our database, which represents the main part of the enire system. Any changes and actions made then will be recorded , updating the database every time. The report creation in any form, as well as the given searches and changes require the access to the database with the aim of accessability , editing and filtrating of entered information.

Results of implementing the application

When talking about steps forward we made in sense of problem solving improvement and higher user satisfaction level, time has shown that the implementation of those new segments was a very good decision. From the statistics in figure 26 below we can see why :

09.09.2009

Izvjestaj mjesecno zaduzenih naloga

U periodu od **19.02.2009** do **09.09.2009** upisano je **6795** naloga

<

Tehnicar	**Broj zaduzenih naloga**												
	januar	februar	mart	april	maj	juni	juli	avgust	septembar	oktobar	novembar	decembar	ukupno
Radeljas	0	74	167	206	271	182	172	187	7	0	0	0	1266
Mirso	0	69	156	224	318	197	172	178	28	0	0	0	1342
Samir	0	72	179	220	318	212	180	182	3	0	0	0	1366
Mesak	0	35	71	76	162	74	85	76	5	0	0	0	584
Dacic	0	12	36	39	88	46	33	45	1	0	0	0	300
Abadzija	0	11	41	33	70	47	54	66	0	0	0	0	322
Sema	0	29	75	93	125	126	106	91	1	0	0	0	646
Bega	0	11	14	17	21	15	6	21	3	0	0	0	108
Suljic	0	16	23	46	90	48	43	26	3	0	0	0	295
Paco	0	0	5	31	31	38	39	30	0	0	0	0	174
Greska	**Broj pogresno unesenih naloga**												37
Ukupno	0	329	771	993	1500	991	896	907	408	0	0	0	6795

Figure 26 Order records indicated per months

Figure 26 clearly shows that the number of issued order intervention is decreasing from month to month (except the period of April and May which is not relevant for our statistics because of bad wheatear circumstances). For example in August a technician had 907 orders to accomplish, in September it was only 408. This is the most relevant indicator for the

decrease of problems by using this application. In other words, the less the number of intervention orders , the better the service quality (since there are falling problem tendencies). Another important fact is that the number of calls at our help desk decreased from about 480 (every 2 minutes a user was calling to report a problem) to about 120 during the work time (8 hours). We obviously see that the HS cable internet crew made a step forward when talking about problem solving measures, which resulted in great user approvals and positive reactions.

Conclusion

The HS cable internet as one of the leading internet providers has a huge responsibility over its users. Therefore the HS technician team is working hard on meeting the user needs in every sense. Being aware of the fact that a high quality service is the only way to defend its leading position at the completion market, constant revisions and system make-over are a must in this business. Since the technologies are improving from day to day, the most important issue is to be up- to date with those changes and to recognize and take new opportunities of the technology universe. Although the originally implemented information system was based on a good work principle, it still could not avoid user dissatisfaction caused by various technical problems. The constantly growing number of HS cable net users was both the motivation for improving the information system and also an indicator for the growing problems caused by lacks in the infrastructure. After revising the information system, segments in which changes needed to be made were clearly defined. The implementation of a new problem detection and prevention software was the first step in ensuring an updated high quality service. Together with the order printing application this should become a powerful instrument for meeting user needs. User comments and also the empirical statistics showed that the HS cable internet surely made a huge step on its way of improvement in sense of operator / user relationship, organization and work discipline. This way a move from a reactive to a proactive way of troubleshooting was enabled. The final product of this is a satisfied user, which is off course the main concern. However, still there is a long way to go when talking about successful service providing. For the further work new goals have already been set. The future plans involve the acceleration of the problem detection and problem solving time frames by a constant implementing of new technologies.

The ideas for the necessary actions to be taken are evaluated through the day to day work experience. These days the idea of an alarm system for preventing and recognizing problems is being evaluated, so user dissatisfaction caused by connection problems, which is the most common problem, can be avoided. This measure should alarm in cases when the cable modem signal quality is not on an appropriate level. The realization of this planned innovation would involve a preventive problem detection that the alarm application would forward to the technicians in charge via mail, sending them a detailed report about the problem and its nature. The implementation of this application is planned as soon as possible, with high expectations set. All in all the HS cable internet is giving great effort to meet their goals in order of ensuring a high quality service level, satisfying current user needs and also attracting new users in sense of expanding their business at the competition market.

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Glossary

CMTS / cable modem termination system or CMTS is equipment typically found in a cable company's headed, or at cable company hub site, and is used to provide high speed data services, such as cable internet or Voice over IP, to cable subscribers.

SNR / Signal-to-noise ratio is an electrical engineering measurement, also used in other fields (such as scientific measurement or biological cell signaling), defined as the ratio of a signal power to the noise power corrupting the signal.

RF / A coaxial RF connector is an electrical connector designed to work at radio frequencies in the multi-megahertz range. RF connectors are typically used with coaxial cables and are designed to maintain the shielding that the coaxial design offers

HFC network / Hybrid fiber-coaxial is a telecommunications industry term for a broadband network which combines optical fiber and coaxial cable.

SNMP/ Simple Network Management Protocol is used in network management systems to monitor network-attached devices for conditions that warrant administrative attention

PHP / Hypertext Preprocessor, is a widely used, general-purpose scripting language that was originally designed for web development, to produce dynamic web pages.