

GEOGRAPHIC INFORMATION SYSTEM OF PUBLIC ADMINISTRATION ON WEB

GEOGRAFICKÝ INFORMAČNÍ SYSTÉM VEŘEJNÉ SPRÁVY NA WEBU

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1. ABSTRACT

Geografické informační systémy (GIS) dnes patří k populárním a důležitým prostředkům pro podporu rozhodování ve veřejné správě i mnoha dalších oblastech lidské činnosti. Bohužel, GIS data jsou drahá a specializovaný software navíc značně komplikovaný, pro běžného uživatele obtížně ovladatelný. Platná legislativa zároveň ukládá orgánům státní správy a samosprávy zveřejňovat informace. V příspěvku je popsána jedna z možných cest - využití Internetových technologií ke zpřístupnění GIS řadovým uživatelům z řad zaměstnanců a laickým uživatelům z řad veřejnosti.

2. INTRODUCTION

Local authorities are supposed to make a lot of global decisions concerning territory, its development and utilization. The decisions are obviously influenced by geography. A duty to publish information on the environment and a free access of the public to information, both given by the law (Law No. 123/1998 Coll., on the right to information on the environment, and Law No. 106/1999 Coll., on the free access to information) cannot be forgotten as well. One of the powerful tools to do this are geographic information systems (GIS) which allow the spatial operations with all of the available data.

While talking about implementing GIS in public administration, one thing must be mentioned. The two basic types of the GIS users can be recognized [3]:

- experienced users who understand the problematic and can fully use GIS and its advantages; it is the only type of the users who need and can work with the full GIS
- end-users who are usually unexperienced. It's possible to distinguish the users who need to use some analytical functions of GIS for their regular work and the users who just need to get some information from GIS.

It is obvious that only the experienced users can use GIS in its depth. For the other users it is a wasting of time and money to have a full GIS which is a pretty complicated system because they don't need all of the functions and usually cannot use them at all. On the other hand, many of the end-users need geographic information for their work or life so it's better to let them use GIS in a simpler version.

3. GIS AND INTERNET

Using Internet technology in GIS is a new wave which seems to meet this kind of demands – to allow not so experienced users to involve GIS into their work and life. At the same time it allows to share expensive GIS-data among the users. Everything can be run via existing intranet, Internet connection is not required.

There are several ways [3] how to implement Internet technology in GIS. Basically, the software can be based on the file presenting model, on the picture presenting model, or on the client/server model. There are some differences among the models. One of the most important things is probably if the model allows an interactive work of a user. Let's have a look on this principles more deeply. The Internet technology offers now a lot of possibilities how to publish or share GIS data:

- *X-protocol* - should be mentioned from the historical point of view – it provides an access from X-terminal to UNIX server. It's not a secure protocol with high demands on a network sources so it's inapplicable to the Internet.
- *HTML element „clicable map”* (IMG and MAP tags of the HTML 3.2) – pre-prepared raster maps are published, and CGM standard of HTML 4.
- *Special clients* based on the CGI scripts, JAVA language or generally on scripting languages can be a good solution in some cases because they are usually cheap or even for free and allow an interactive work of the users. The disadvantages of this solution are that they usually don't support complicated analyses and it is very difficult and time-consuming to create them (e.g. Jshape)
- Specialized software packages – *map servers* - based on the client/server model. This solution is quite costly for the publisher but cheap for the user because a common Web browser is mostly used as a client. This type of solution allows an interactive work of the users and support more sophisticated analyses. HTTP protocol is used for the whole communication. Nowadays, we can find many commercial solutions (see Table 1). Among the given examples there is one exception there. MapServer Package created by the employees of the University of Minnesota is for free.

Table 1 – Some examples of available Internet Map Server solutions

Software Package	Producer
MapGuide [1]	Autodesk
Model Server [2]	Bentley
ArcView Internet Map Server	ESRI
MapObjects Internet Map Server	
Arc Internet Mapping System [4]	
GeoMedia Web Map [6]	Intergraph
ProServer [7]	MapInfo
SpatialFX Server [9]	Object/FX Corporation
Lava/Magma [8]	Professional GEO Systems BV
MapServer Package [5]	University of Minnesota

4. INTERNET MAP SERVERS

Internet map servers (IMS) are based on the model client/server in a changed form. Unlike the typical client/server model, the three layers are recognized: client, Web server and application map server [3, 4].

Client is a Web browser which communicates with Web server by means of URLs. Some Plug-ins, Active-X components or JAVA Applets can be added to the browser so the browser can work more efficiently and provide higher comfort for the users. Web browsers are for free or for a small price so it's a good solution for an end-user. Smarter clients which can run some analyses by themselves are being developed.

Web server plays a role of an interpreter between a client and a map server. Client communicates with the Web server only. Web server passes it's requests to a map server, obtains a map server's answer, translates it into HTML format and sends it back to the client. The enough credible Internet HTTP protocol is used for the communication. Each solution supports only given Web server so one must run the proper Web server to let application map server work.

Application map server treats data (it should be able to use both spatial and attribute data), runs analyses and solves the client's requests. This part of the solution is surely the most expensive and demanding one.

5. CHOSEN MAP SERVERS

After trying some software packages, the MapObjects Internet Map Server and MapServer Package were chosen for the next work. They meet probably the most important need from our point of view – they support ArcView shapefiles and ARC/INFO coverages data formats.

There is an important difference between the packages in required operating system (OS) and Web server (see Table 2). This difference consequently results in the further differences in the price and process of installation and configuration of both of the map servers.

Table 2 – Requirements of the chosen IMS

Software Package	MapObjects IMS 2.0 eval.	MapServer 2.3
OS	MS Windows NT	Linux
Web Server	MS IIS	Apache

MapObjects IMS (see Figure 1) was run on MS Windows NT 4.0 with MS Internet Information Server as a Web server. This solution met our demands, we had no troubles while making it run. As an ESRI's product it supports it's data formats so there were no problems with preparing data as well. User support provided by the firm is very good as well.

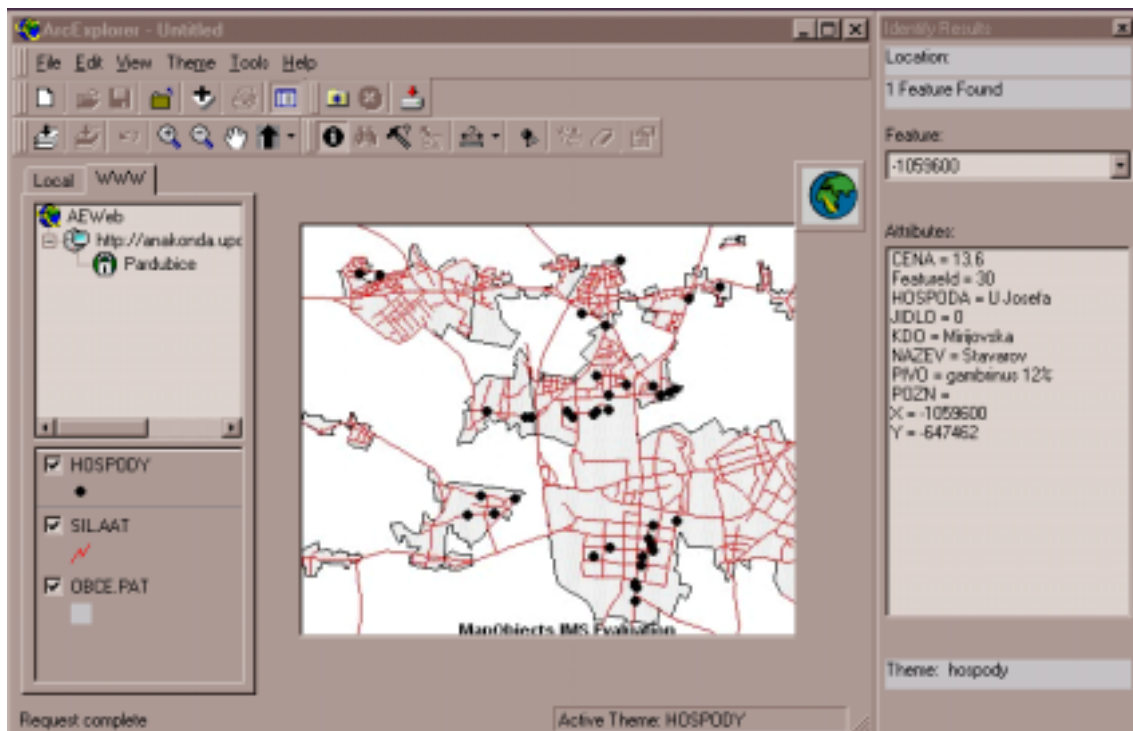


Figure 1 - User environment provided by MO IMS

MapServer (see Figure 2) was run on Linux (Slackware) with Apache Web server. This IMS is a product of employees of the University of Minnesota and is for free with a good user support too. The disadvantage of this solution is that it is not as easy to make it run as the commercial packages (e.g. MapObjects Internet Map Server). In terms of public administration it means there must be an experienced IT worker who

makes the server run. Anyway, considering the amount of money usually available and the obtained results, this solution seems to be reasonable.

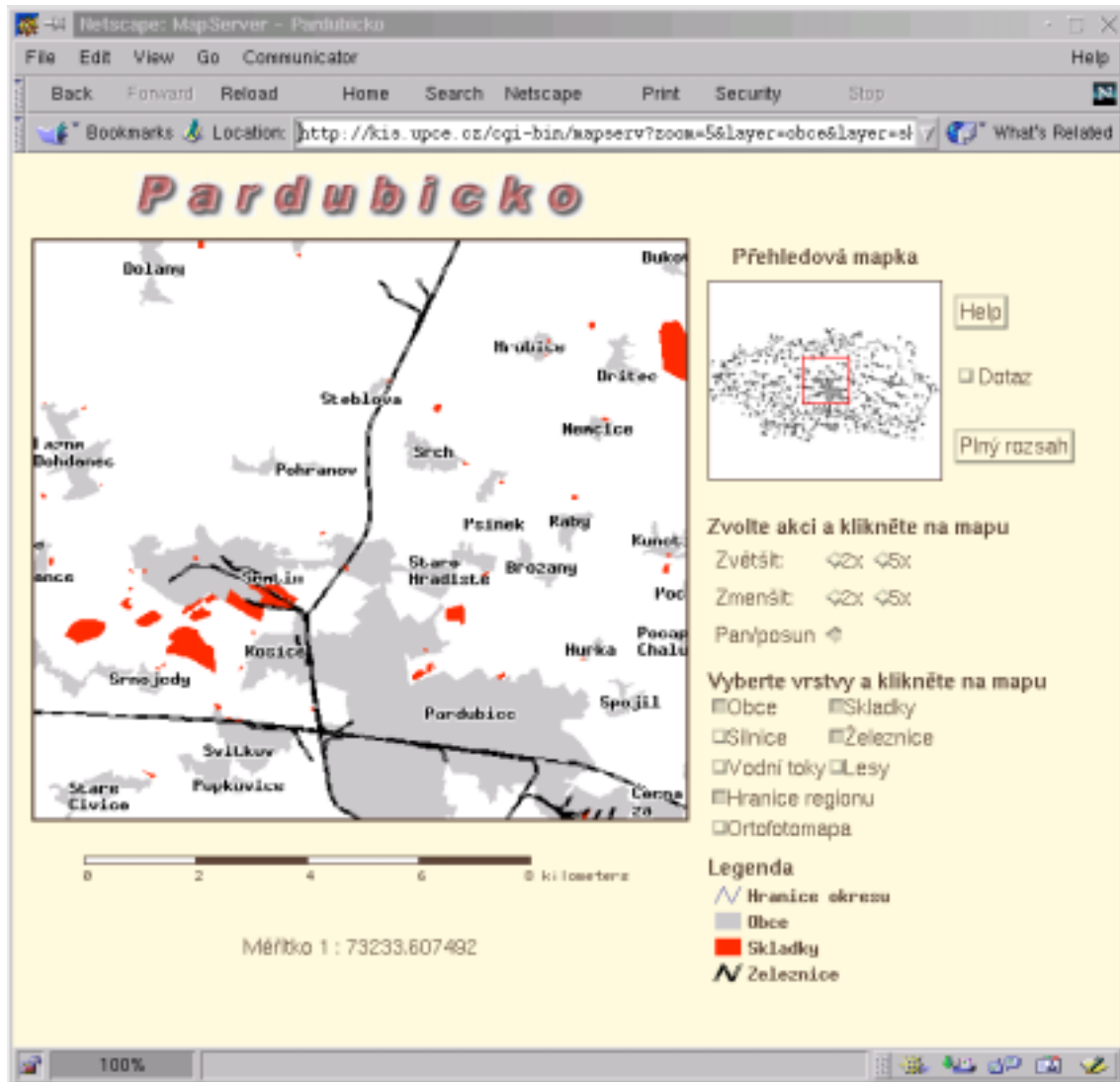


Figure 2 - User environment provided by MapServer

6. CONCLUSION

Each local authority is responsible for a certain territory, its reasonable utilization and development what means a local authority must prepare longtime plans of the region development as well as make a lot of decisions. Today, it's impossible to do this without dealing with a large amount of different information concerning the territory including spatial data. All of the various information should be considered globally. GIS is a helpful tool for supporting the work of public administration bodies. On the other hand, a full GIS is very complicated and expensive software so there is no sense to provide it to all of the end-users „as is”. It's much more better to give them a simpler tool which meets their demands, allows them to access GIS sources but don't force them to become an experienced GIS and computer user. Employing the Internet technology in GIS is one of the possible solutions. Another advantage of the solutions is the possibility of sharing of expensive GIS-data among the users.

Internet map servers can be successfully used in schools too for showing the basic principles of GIS and teaching the basics of a work with GIS. Internet connection isn't required in any case, an existing intranet is sufficient.

7. REFERENCES

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