VOICE AGENTS

D B Lange

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II.2

Voice Agents

Computer-Human Voice Dialog with a Personal Touch

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Chief Technology Officer
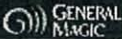General Magic, Inc.

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Outline of Presentation

- Background and Experience
- Software Agents Definition
- Agent Definition Format
- Agent Server Architecture
- Agent Applications
- Voice Agents
- Conclusion

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General Magic's Business

General Magic is a voice application services provider delivering the premier voice user interface to leading telecommunications, enterprise and Internet companies
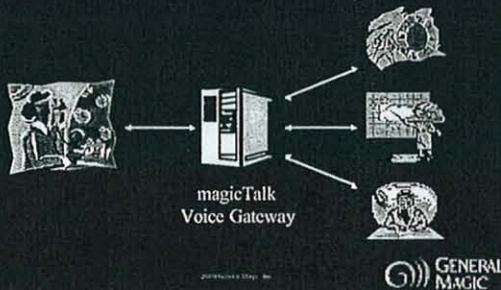
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The Power of magicTalk

- Open, standards-based architecture
  > VoiceXML, HTTP, Java, CORBA
  > Vendor independent platform enabling
    - Choice of speech recognition engines: Nuance, IBM ViaVoice
    - Choice of text to speech engines: Fonix, Lernout & Hauspie
    - Choice of telephony services: Intel/Dialogic, IBM DirectTalk
- Superior voice user experience
  > VUI with personality
  > Personalization
  > Dialog development methodology

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magicTalk Voice Gateway

magicTalk
Voice Gateway

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General Motor's OnStar Service

- In-vehicle voice-only experience
- Super-thin client: Wireless 3 watt phone & GPS
- Personalized features:
  > Receive and reply to email
  > News
  > Stock quotes
  > Weather
  > Sports scores

OnStar
HOW CAN WE HELP YOU?

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Background and Experience

- The Aglets Project
  > Mobile Java agent
  > Java-based class framework
  > Agent design patterns
  > Internet-based (Agent Transfer Protocol)
  > Many, many users
  > Released as Open Source by IBM

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Lessons Learned

- Many good reasons for mobile agents
- But few compelling applications
- Hard to program and hard to test
- Fragile by nature and not reliable
- Not safe - not for the Internet
- System programming oriented

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Different Approach

- From a technology-centric approach

- To an application- and information-centric approach
  > Scripting
  > XML
  > HTTP

Voice Agents

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Software Agents Definition

- Personalized
- Continuously running
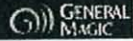- Semiautonomous
- Communicating

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Personalized

- Software object
- Acting on behalf of user
- State is unique
- Script is unique
  > Agent behavior may be modified by individual users to accommodate their specific needs
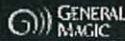
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Continuously Running

- Long-lived
- Running 24 hours 7 days a week
- Hosted in a network
- Will respond to events
  > Agent will call you on the phone when you receive an important email

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Semiautonomous

- Hold personal information
- Can act as proxies
- Can perform transactions on the Internet
  - > Agent will re-book you on another flight if your planned flight is cancelled

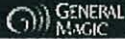GENERAL MAGIC

Communicating

- Agents are communicating with
  - > Agents
    - Via HTTP and XML
  - > Network Services
    - Via IP, HTTP, XML, and HTML
  - > Users
    - Via phone, pager, fax, Web, and email

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Agent Definition Format (ADF)

- Agent scripting language
- Based on the eXtensible Markup Language (XML)
- Script and state: both represented in XML
  - > Agent snapshot is a text file: `myAgent.adf`
- "ADF - the HTML of Internet agents"
  - > Users with some technical flair can create their own software agents

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Overview

- Generic programming constructs in ADF
  - > Variables (cells)
  - > Procedures (handlers)
  - > Execution control

- Rich and open-ended set of extension tags via "wrappers"

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Cells

- Cells are variables that store XML data

```
<cell name="meeting">
  <month> March </month>
  <day> 4 </day>
  <year> 1999 </year>
</cell>
```
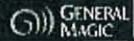
- Retrieval: $meeting or

```
<recall name="meeting"/>
```

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Cell Manipulation

```
<set name="address">
  <number>1234</number>
  <street>Yorkshire Dr.</street>
</set>

<unset name="address"/>
```

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Handlers

- Handlers are the procedures of ADF

```
<handler name="next-meeting">
  Next meeting is in $meeting.month
</handler>
```

- AREF: *"host / agent-name # handler-name"*

```
<call aref="weather.com/svc.adf#city">
  San Jose
</call>
```

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Control

- ADF support a number of tags to control execution of handlers

```
<switch value="$city">
  <case value="Los Angels">
    Sunny.
  </case>
  <case pattern="San (Francisco|Jose)">
    Sunny and somewhat breezy.
  </case>
  <case>
    Sorry, no information on $city.
  </case>
</switch>
```

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"Hello World" With ADF

```
<adf version="0.1">
 <handler name="index"
          mimeType="text/html">
  <html xmlns="www.w3.org/REC-html40">
   <body>
    <center>
     Hello World!
    </center>
   </body>
  </html>
 </handler>
</adf>
```

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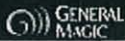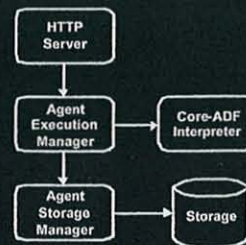## Web Access With ADF (I)

```
<handler name="index"
         mimeType="text/html">
 <html xmlns="www.w3.org/REC-html40">
  <body>
   Aglet book is ranked
   <call aref="#update"/>.
  </body>
 </html>
</handler>
```
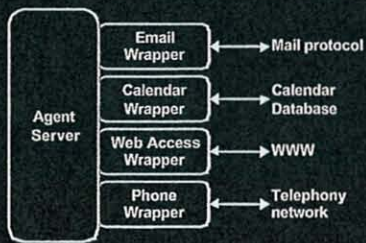
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Web Access With ADF (II)

```
<handler name="update">
 <url:post action="www.amazon.com"
           value="keyword-query=Aglets"
           result="page"/>
 <regexp pattern="Rank:.*?>(.*?)&lt;"
         result="rank">
    $page
 </regexp>
 $rank
</handler>
```

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Agent Server Architecture

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Wrappers: Extensibility

Agent Server	Email Wrapper	→ Mail protocol
	Calendar Wrapper	→ Calendar Database
	Web Access Wrapper	→ WWW
	Phone Wrapper	→ Telephony network

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Wrappers

- The "services" of the agent server
- Packages of Tag Handlers
- Written in Java
- Developer API exists
- Similarity with Sun's Tcl scripting language
- Some existing wrappers:
  > Email, Web, Phone, Calendar, and Contacts

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Some Email Wrapper Tags

```
<send to="danny@acm.org">
 <subject>
    Meeting next week
 </subject>
 Hi Danny,
 Don't forget the meeting next week.
</send>
```

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Applications

- Personal Finance
  > Stock trading and portfolio management
- Travel Services
  > Flight delay notification and ticket purchase
- Electronic Commerce:
  > Auctions
  > Shopping
  > Ticketing
  > Search

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A Real Agent: eBay Agent

- Your personal agent for eBay online auctions
  > www.eBay.com
- Internet auction via phone
- Notifies bidders when they are outbid and when an auction is about to finish
- Allows bids to be placed via voice and phone

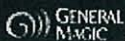*Increases your chances of wining an auction!*

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Voice Agent SDK

- Graphical development tool
- Wrapper developer API
- Email and web wrapper
- Local desktop agent server
- Secure hosting
- Documentation
- Community for wrapper exchange

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Conclusion

- Voice Agents and ADF serves as glue between many services and media
- eBay Agent shows new ways of interacting with the Internet
- New meaning to the term "ubiquitous Internet access"

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Contact Information

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  http://www.generalmagic.com

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