Summary

• Introduction
  • The JDispatcher framework
  • The services
  • Usage statistics

• Features

• Programmatic access
  • How do I use the web services?
  • What can I use them for?
Introduction

• EMBL-EBI provides fast and reliable access to various bioinformatics analysis tools

• Behind the web forms…
  • Interface with the user (web pages, programmatic access…)
  • Job management (Queues, cluster…)
  • Input validation
  • Result analysis (Assist users as much as possible)

• Web services at the European Bioinformatics Institute-2009

• A new bioinformatics analysis tools framework at EMBL–EBI.
JDispatcher in July 2009…

• ~10 Tools
  • Sequence similarity search
    (FASTA, SSEARCH, PSISearch, NCBI BLAST, WU BLAST)
  • Multiple sequence alignments
    (ClustalW2, Kalign, MAFFT, Muscle, T-Coffee)

• 1 Data centre (Hinxton)
  • ~100 servers
  • ~1000 cores

• 1.5M Job submissions per month
  • Mostly old framework
... and today

- ~90+ Tools
  - Sequence similarity Search (FASTM, PSIBLAST, NCBI BLAST+)
  - Multiple sequence alignments (Clustal Omega, DbClustal, Mview, Prank)
  - Protein functional analysis (InterProScan, Phobius)
  - Pairwise sequence alignments (LALIGN, EMBOSS Needle, Stretcher, Matcher, Water)
  - Phylogeny (ClustalW2)

- 2 Data centres (London) with failover to Hinxton
  - ~200 servers
  - ~2000 cores

- ~10M+ jobs per month
Features

- Homogeneous interface
  - Standard look & feel (*UX research & user feedback*)
  - User friendly (*Only show what most users are interested in*)
Features

- Multiple options to analyse the results
- Standard raw output
- Interactions with external applications
- Helpful visual representations
Programmatic access

• Popular!
  2011: Recorded 38000 e-mail addresses (3000 domains)
  150 countries/organisations (260000 remote hosts)

• At EMBL-EBI it used by several projects
to embed tools in their web
applications (UniProt, Ensembl Genomes,
InterPro, PDB…)

• Simple but robust API
  • SOAP & REST Web Services
  • Standard set of methods
How?

- Well documented
  - [http://www.ebi.ac.uk/Tools/webservices](http://www.ebi.ac.uk/Tools/webservices)
  - Pre-compiled clients available for a large variety of languages

- SOAP
  - WSDL: [http://www.ebi.ac.uk/Tools/services/soap/{tool}?wsdl](http://www.ebi.ac.uk/Tools/services/soap/{tool}?wsdl)
  - Most programming languages have SOAP client libraries
  - Generate stubs or dynamically call methods

- REST
  - [http://www.ebi.ac.uk/Tools/services/rest/{tool}/{method}/{params}](http://www.ebi.ac.uk/Tools/services/rest/{tool}/{method}/{params})
  - Basic HTTP requests
  - Web browser, HTTP client libraries, CURL…
Only 3 simple steps...

**Meta-Information**
- List parameters
- Get parameter details
  → Name, description, values...

**Submission**
- Run *(Email, title, values...)*
  → Job Identifier
- Check status
  → RUNNING, FINISHED, ERROR...

**Results analysis**
- List results available
  → Name, description, media type...
- Get result
  → Output, text, binaries (images)...

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**Input parameters**

**Job identifier**
(e.g. iprscan-S20110708-094729-0726-35857540-pg)
Ideal for workflows

• JDispatcher is like a warehouse of web services
  • Building blocks ready to be assembled together

• Examples:
  • Produce orthologous alignments and trees
    \textit{(Blast} $\rightarrow$ \textit{Identifiers} $\rightarrow$ \textit{ClustalW/Omega} $\rightarrow$ \textit{True phylogenies)}
  • Study protein-protein interactions
  • Tie in EBI Search and link Blast/InterProScan results with literature citations

• Compatible with YABI, GALAXY, Taverna, Triana, Membrane...
Typical workflow Examples

- NGS/Seq Nucleotide InterProScan
- Blast2InterPro
- SSS -> FetchData -> MSA
- InterProScan + tmhmm & signalp
- Protein Transmembrane Prediction
- Protein Identification: EBI Picr -> UniParc & InterPro
- MSA – Phylogenetic Tree
- Blast2IntAct
- Blast2Medline
- EBI Search/EB-eye
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More information

- http://www.ebi.ac.uk/Tools
- http://www.ebi.ac.uk/support
- http://www.ebi.ac.uk/Tools/webservices
- http://www.ebi.ac.uk/Tools/webservices/help/faq
- http://www.ebi.ac.uk/Information/Brochures/factsheet_pdf/Web_Services_May10.pdf