Technical Information

Created: July 18, 2005; Updated: March 3, 2021.

LinkOut is a service that allows users to link directly from PubMed and other NCBI databases to a wide range of information and services with the purpose of providing NCBI database users with on-target supplemental information to NCBI database records. LinkOut aims to facilitate access to relevant online resources to extend, clarify, and supplement information found in the NCBI databases.

Participating LinkOut providers, including publishers, aggregators, and other web resources, can display links to their sites on records from the NCBI databases.

Resources Description
LinkOut requires two types of files, Identity and Resource files, to describe online resources. These files are specified in the LinkOut DTD and are provided by a participating provider. These files include the necessary elements for the NCBI retrieval system to construct an appropriate URL to access specific resources.

Publishers and Other Full-Text Providers
Publishers and other full-text providers can use LinkOut to provide links from PubMed citations to their Web-accessible full-text journals. For publishers who supply their data to PubMed electronically and providers of free full text, an icon link will appear in PubMed's Abstract format by default (more about default icons). Additional information and file examples for publishers and other full-text providers are available in Information for Full-Text Providers.

Other Resources
LinkOut can also be used to provide links from NCBI databases to non-bibliographic Web resources, such as factual databases (i.e., organism-specific, taxonomy, structure and other databases), catalogs of research materials (clones, strains, probes, etc.), funding opportunities, clinical resources, research groups, and others.

LinkOut DTD

The LinkOut Document Type Definition (DTD) specifies the XML elements used in LinkOut files. The LinkOut DTD is available at LinkOut.DTD.

The URL for the DTD must be included in the prolog of a LinkOut file.

In the identity file, use:

<!DOCTYPE Provider "-//NLM//DTD LinkOut 1.0//EN" "https://www.ncbi.nlm.nih.gov/projects/linkout/doc/LinkOut.dtd">

In a resource file, use:

<!DOCTYPE LinkSet "-//NLM//DTD LinkOut 1.0//EN" "https://www.ncbi.nlm.nih.gov/projects/linkout/doc/LinkOut.dtd">

```
<!-- Typical usage:

        <!DOCTYPE LinkSet PUBLIC "-//NLM//DTD LinkOut//EN" "LinkOut.dtd">
        <LinkSet>
        ...
         </LinkSet>

         or:

         <!DOCTYPE Provider PUBLIC "-//NLM//DTD LinkOut//EN" "LinkOut.dtd">
         <Provider>
         ...
         </Provider>
    -->
<!--

    Rule based URL generation. In general, to build the
    URL both base and rule are required, where base is the
    HTTP base address, for example:

    http://www.sciencemag.org/cgi/content/full/

    and rule is in the following format:
&lo.vol;/&lo.iss;/&lo.page;

    LinkOut will replace the keywords in rule with the actual
    value for a retrieved citation. Therefore, rule will be
    translated into: 281/5384/1863

    The program will concatenate base with rule:

    http://www.sciencemag.org/cgi/content/full/281/5384/1863

The following keywords are supported for any database:

lo.id - Unique identifier (PMID, TaxID, etc.)

For PubMed only

lo.pii   - Publisher Item Identifier.  Must be submitted by the publisher. For example,
6847, in the PubMed DTD this ID is an attribute of the ArticleId element.
lo.doi   - Article DOI
lo.issn  - Journal ISSN code
lo.essn  - Journal Electronic ISSN code
lo.issnl - Journal ISSN code without the dash
lo.jtit  - Journal title (MEDLINE abbreviation)
lo.vol   - Volume
lo.iss   - Issue
lo.page  - First page
lo.year  - Four digit year. For example, 1998
lo.yr    - Last two digit of year. For example, 98; 00
lo.yl    - Last digit of year. For example, for 1999 use 9; for 1990 use 0.
lo.eyear - Four digit year of electronic publication date. For example, 1998
lo.eyr   - Last two digits of year of electronic publication date. For example, 98; 00
```

```
lo.eyl   - Last digit of year of electronic publication date. For example, for 1999
use 9; for 1990 use 0
lo.month - The month. For example, September
lo.mon   - The 3 letter month abbreviation. For example, Sep
lo.mo    - Two digit month. For example, 01; 12
lo.emonth- The month of electronic publication date.  For example, September
lo.emon  - The 3 letter month abbreviation of electronic publication date. For
example, Sep
lo.emo   - Two digit month of electronic publication date.
For example, 01;12
lo.day   - Two digit day. For example, 01; 31
lo.eday  - Two digit day of electronic publication date.  For example, 01; 31
lo.auth  - First author
lo.authln- Last name of the first author
lo.nlmid - NLM unique Identifier
lo.bookacc- Book accession number of a record
lo.bookname- Internal id for a book record
lo.elocationid - Electronic location Identifier of a record

For Sequence databases (Nucleotide, Protein, Structure, Genome):

lo.pacc  - Primary accession for sequences

For Taxonomy only:

lo.scientificname - Full scientific name.For example: "Homo sapiens neanderthalensis"
lo.genus - genus name
lo.species - species name
lo.subsp - subspecies name
For Gene only:

lo.genename - Gene name
lo.orgname - binomial, and strain when appropriate, from NCBI Taxonomy database
lo.taxid - unique identifier from NCBI Taxonomy database
lo.mimid - identifier(s) from Online Mendelian Inheritance in Man (OMIM)
-->
<!ENTITY lo.id                "lo.id">
<!ENTITY lo.pii               "lo.pii">
<!ENTITY lo.doi               "lo.doi">
<!ENTITY lo.issn              "lo.issn">
<!ENTITY lo.essn              "lo.essn">
<!ENTITY lo.issnl             "lo.issnl">
<!ENTITY lo.jtit              "lo.jtitle">
<!ENTITY lo.vol               "lo.vol">
<!ENTITY lo.iss               "lo.iss">
<!ENTITY lo.page              "lo.page">
<!ENTITY lo.year              "lo.year">
<!ENTITY lo.yr                "lo.yr">
<!ENTITY lo.yl                "lo.yl">
<!ENTITY lo.eyear             "lo.eyear">
<!ENTITY lo.eyr               "lo.eyr">
<!ENTITY lo.eyl               "lo.eyl">
<!ENTITY lo.month             "lo.month">
<!ENTITY lo.mon               "lo.mon">
<!ENTITY lo.mo                "lo.mo">
<!ENTITY lo.emonth            "lo.emonth">
<!ENTITY lo.emon              "lo.emon">
<!ENTITY lo.emo               "lo.emo">
<!ENTITY lo.day               "lo.day">
```

```
<!ENTITY lo.eday                    "lo.eday">
<!ENTITY lo.auth                    "lo.auth">
<!ENTITY lo.authln                  "lo.authln">
<!ENTITY lo.nlmid                   "lo.nlmid">
<!ENTITY lo.bookacc                 "lo.bookacc">
<!ENTITY lo.bookname                "lo.bookname">
<!ENTITY lo.elocationid             "lo.elocationid">
<!ENTITY lo.pacc                    "lo.pacc">
<!ENTITY lo.scientificname          "lo.scientificname">
<!ENTITY lo.genus                   "lo.genus">
<!ENTITY lo.species                 "lo.species">
<!ENTITY lo.subsp                   "lo.subsp">
<!ENTITY lo.genename                "lo.genename">
<!ENTITY lo.orgname                 "lo.orgname">
<!ENTITY lo.taxid                   "lo.taxid">
<!ENTITY lo.mimid                   "lo.mimid">


<!-- Entities for special characters -->


<!ENTITY reg        "&#174;" >
<!ENTITY copy       "&#169;">
<!ENTITY trade      "&#8482;">


<!-- internal DTD entities -->


<!ENTITY % url.data              "#PCDATA">
<!ENTITY % rule.data             "%url.data; | pad | apad | subs
                                 | toupper | tolower | strip | normalize">
<!ENTITY % iso.lang.codes        "(DA|DE|EN|EL|ES|FR|IT|IW|JA|NL|NO|RU|SV|ZH)">
<!ELEMENT SubjectType            (#PCDATA)>


<!-- can be one of the following; see LinkOut SubjectTypes and Attributes at
https://www.ncbi.nlm.nih.gov/books/NBK3807/#files.Special_Elements_SubjectType
for a description of these elements:

//CHEMICAL INFORMATION
        Biological Properties
        Chemical Libraries
        Imaging Agents
        Metabolism
        Molecular Interactions
        Physical Properties
        Reactions
        Theoretical Properties
        Toxicology
        Vendors

//EDUCATION
        conferences/meetings/workshops
        glossaries/dictionaries
        online tutorials/courses

//FUNDING SOURCES
        funding sources

//LITERATURE
        abstracts/indexes/summaries
        aggregators
        books
```

```
        images
        individual online article
        institutional repository
        libraries
        patent databases
        publishers/providers
        supplemental materials
        systematic reviews

//MEDICAL
        clinical trials
        consumer health
        diagnostics
        disease organizations
        medical equipment and devices
        pharmacology
        treatment guidelines

//MOLECULAR BIOLOGY DATABASES
        DNA/protein sequence
        gene/protein/disease-specific
        gene expression
        locus-specific
        mapping
        organism-specific
        population/variation
        protein interactions/pathways
        structure
        taxonomy/phylogenetic

//RESEARCH MATERIALS
        clones/clone libraries
        culture/stock collections
        laboratory equipment
        oligonucleotides
        other reagents

//RESEARCHERS
        colleges/universities
        companies/research institutes
        directories
        individuals
        societies/associations

//TOOLS
        3D structure prediction/functional modeling
        primer design
        protein identification/characterization
        restriction mapping
        sequence screening/similarity/alignment
        sequence viewer
        translation
-->

<!ELEMENT Attribute   (#PCDATA)>
<!-- can be one of the following; see LinkOut SubjectTypes and Attributes at
https://www.ncbi.nlm.nih.gov/books/NBK3807/#files.Special_Elements_Attribute

for a description of these elements:
```

```
//BARRIERS
        registration required
        subscription/membership/fee required

//OWNERSHIP
        author of URL
        publisher of information in URL

//Resource Form
        author manuscript
        electronic full-text
        full-text online
        full-text PDF
        full-text PostScript
        order form
        print collection

//Administrative
        preference
-->
<!-- This is the top level element for Provider -->
<!ELEMENT Provider              (ProviderId, Name, NameAbbr, SubjectType?,
 Attribute*, Url*, IconUrl*, Brief?, ExclFileName*)>
<!ELEMENT ProviderId            (#PCDATA)>
<!ELEMENT Name                  (#PCDATA)>
<!ELEMENT NameAbbr              (#PCDATA)>
<!ELEMENT Url                   (%url.data;)>
<!ATTLIST Url         LNG    %iso.lang.codes;  "EN"  >
<!ELEMENT IconUrl               (%url.data;)>
<!ATTLIST IconUrl    LNG    %iso.lang.codes;  "EN"  >
<!ELEMENT Brief                 (#PCDATA)>
<!ELEMENT ExclFileName                         (#PCDATA)>
<!ATTLIST ExclFileName
               fieldname      (uid|query)             "uid"
               database       CDATA           #REQUIRED>

<!-- End of Provider group -->

<!ELEMENT LinkSet               (Link+)>
<!ELEMENT Link                  (LinkId, ProviderId, IconUrl*,
(ObjectSelector|SubObjectSelector),(ObjectUrl+)>
<!ELEMENT LinkId                (#PCDATA)>
<!ELEMENT ObjectSelector        (Database, ObjectList)>
<!ELEMENT Database              (#PCDATA)>
<!-- All NCBI databases may be configured to include LinkOut. Please write to
 linkout@ncbi.nlm.nih.gov for the current list of databases available for LinkOut -->

<!ELEMENT ObjectList            (FileName|(Query,ExclQuery*,ExclObjId*,ExclFileName*)|
ObjId)+>
<!ELEMENT FileName              (#PCDATA)>
<!ATTLIST FileName               fieldname   CDATA    #REQUIRED>

<!ELEMENT Query                 (#PCDATA)>
<!ELEMENT ObjId                 (#PCDATA)>
<!ELEMENT ExclObjId             (#PCDATA)>

<!-- End of ObjectList group -->
<!-- End of ObjectSelector group -->
```

```
<!-- Libraries must use SubObjectSelector to refer to the sub providers -->
<!ELEMENT SubObjectSelector       (Database, SubProvider)>
<!ELEMENT SubProvider             (NameAbbr, (InclQuery|ExclQuery)*)>
<!ELEMENT InclQuery               (#PCDATA)>
<!ELEMENT ExclQuery               (#PCDATA)>
<!-- End of SubObjectSelector group -->


<!ELEMENT ObjectUrl               (((Base, (Rule|RuleToMany)?) | (Rule|RuleToMany)),
UrlName?, SubjectType?, Attribute*)>


<!ATTLIST ObjectUrl       LNG    %iso.lang.codes;  "EN" >


<!ELEMENT Base                    (%url.data;)>
<!ELEMENT pad                     (%rule.data;)*>
<!-- used to mark up strings that require padding to create
     fixed-length string attributes. -->


<!ATTLIST pad
        with                CDATA                   #REQUIRED
        width               CDATA                   #REQUIRED
        align             (left|right)              "right">
<!-- with a character to pad with (required)
     width result string size (required) (integer)
align the text should align to (left|right) (default:right)
     -->


<!ELEMENT apad                    (%rule.data;)*>
<!-- used to mark up strings that require padding to create
     fixed-length string attributes. It skips all preceding
     alpha characters before padding -->


<!ATTLIST apad
        with                CDATA                   #REQUIRED
        width               CDATA                   #REQUIRED
        align             (left|right)              "right">
<!-- with a character to pad with (required)width result string size (required)
(integer)align the text should align to (left|right) (default:right)
     Examples:
      <apad with = "0" width = "6">E32</apad>  => "E00032"
      <apad with = "0" width = "6">640</apad>  => "000640"
     -->
<!ELEMENT subs                    (%rule.data;)*>
<!-- substitute one string for another in the element's content -->
<!ATTLIST subs
        for                 CDATA                   #REQUIRED
        with                CDATA                   #REQUIRED>
<!-- for the string to replace with the string to substitute -->


<!ELEMENT toupper                 (%rule.data;)*>
<!-- convert element content into upper case -->
<!ELEMENT tolower                 (%rule.data;)*>
<!-- convert element content into lower case -->
<!ELEMENT strip                   (%rule.data;)*>
<!-- strip off spaces/letters/digits in the element's content -->


<!ATTLIST strip
 what    (spaces|letters|nondigits|digits)      #REQUIRED>


<!ELEMENT normalize               (%rule.data;)*>
```

```
<!-- are used for normalization of &lo.vol, &lo.iss; elements. Examples:
            "Pt 5"                     ==> "5"
            "3 Suppl"                  ==> "3"
            "2A Pt 3"                  ==> "2A"
            "10 Suppl 2 Pt 1"        ==> "10"
            "2/3"                      ==> "2"
      -->


<!ELEMENT Rule                    (%rule.data;)*>
<!ELEMENT UrlName                 (#PCDATA)>
<!ELEMENT RuleToMany              (Rule, Separator)>
<!ELEMENT Separator               (#PCDATA)>


<!-- End of ObjectUrl group -->
<!-- End of Link group -->
<!-- End of LinkSet group -->
```

Databases Available for Linking

Links can be made from the following NCBI databases to outside resources. When entering the database in the <Database> element, use the Db abbreviation, rather than the database name.

Database Name	Db Abbreviation
https://www.ncbi.nlm.nih.gov/bioproject	BioProject
https://www.ncbi.nlm.nih.gov/biosample/	BioSample
https://www.ncbi.nlm.nih.gov/cdd	Conserved Domains
https://www.ncbi.nlm.nih.gov/gene	Gene
https://www.ncbi.nlm.nih.gov/nucleotide	Nucleotide
https://www.ncbi.nlm.nih.gov/est	NucEST
https://www.ncbi.nlm.nih.gov/gss	NucGSS
https://www.ncbi.nlm.nih.gov/pubmed	PubMed
https://www.ncbi.nlm.nih.gov/pccompound	PubChem Compound
https://www.ncbi.nlm.nih.gov/protein	Protein
https://www.ncbi.nlm.nih.gov/taxonomy	Taxonomy

If you are interested in providing LinkOut links to other NCBI databases not listed in the above table, please write to **info@ncbi.nlm.nih.gov** to express your interest to the relevant groups at NCBI. Note that LinkOut is able to link only to 5% of the total database records (depending on database size).

Icons

Icons should:

- Be 120 pixels wide x 30 pixels high or smaller.
- Be in one of the following image formats: GIF, JPEG, or PNG
- The icon URL for an icon file should not include XML escape characters such as &, ", <, >, '
- Identify the resource being linked. For libraries, this could be the library name. For resource providers, this could be the name of the resource and/or the format or language in which the resource is being delivered.

- If a journal or database resource is freely available, or free with a registration, the icon should have the text "Free."
- Look like an actionable button. The icon should have a border and a colored background. Icons and text should be easy to read and should not blend in to the PubMed display.
- Not be animated.

The icon file name should use only letters from the English alphabet and numbers. Do **not** use special characters or spaces. Examples of file names are: libft.gif, libprint.gif, freeft.jpg, notfree.jpg.

Examples of icons are shown below.

Library icons

Other provider icons

Identity File

The identity file contains the information about a provider that NCBI needs to list the provider in LinkOut. This file must be named **providerinfo.xml**; the file name is case sensitive.

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Identity File Format

Note: The following format description shows the basic structure of an Identity file and includes all possible elements. Not all elements will be used in all files. Additional examples of Identity files are available for full-text providers and other resource providers.

```
<?xml version="1.0"?>
<!DOCTYPE Provider PUBLIC "-//NLM//DTD LinkOut 1.0//EN"
"https://www.ncbi.nlm.nih.gov/projects/linkout/doc/LinkOut.dtd">
<Provider>
<ProviderId>ProviderId assigned by NCBI(required)</ProviderId>
    <Name>Name of Resource Provider or Library(required)</Name>
    <NameAbbr>NameAbbr assigned by NCBI(required)</NameAbbr>
    <SubjectType>SubjectType (optional)</SubjectType>
```

```
   <Attribute>Attribute (optional, repeatable)</Attribute>
   <Url>URL of provider's website(optional, repeatable)</Url>
   <Brief>Short description of resource provider(optional)</Brief>
</Provider>
```

Identity File Prolog

The Prolog occurs once at the beginning of the file.

XML Declaration *(required)***:** <?xml version="1.0"?>

Document Type Declaration *(required)***:** <!DOCTYPE Provider PUBLIC "-//NLM//DTD LinkOut 1.0//EN" "https://www.ncbi.nlm.nih.gov/projects/linkout/doc/LinkOut.dtd">

Identity File Elements

The following lists all elements that may be included in the Identity File. Not all elements will be used in every Identity file.

Provider*(required)***:** Root element of the file

ProviderId *(required)***:** A unique ID assigned by NCBI

Name *(required)***:** The full name of the resource provider. For other providers, this is the name of the organization.

NameAbbr *(required)***:** A short one-word name for the resource provider. NameAbbr may only include alpha and numeric characters; spaces and special characters such as hyphens are not allowed. Because this element must be unique, NCBI reserves the right to adjust it as necessary. Resource providers who are submitting, or may submit, links on behalf of multiple publishers should select a neutral NameAbbr.

SubjectType *(optional)***:** SubjectTypes are used to display resources by Subject Category. SubjectTypes included in the identity file apply to all resources provided by a provider. See Special Elements: SubjectType for a list of SubjectTypes and descriptions. If no SubjectType is given, the SubjectType "miscellaneous" will be assigned automatically.

Attribute *(optional, repeatable)***:** Attributes describe resources independent of content and describe any ownership of the information that is being claimed by the individual or organization providing the link. Attributes included in the Identity file apply to all resources provided by a provider. See Special Elements: Attribute for the list of Attributes and descriptions.

Url *(optional, repeatable)***:** URL of the library or resource provider's website, used in the LinkOut Providers list. *Note*: The URL may be different for different languages; see the LNG attribute in the LinkOut.DTD.

Brief *(optional - displayed in My NCBI)***:** Short description of the resource provider. Maximum is 255 characters.

The **providerinfo.xml** file is specified in the LinkOut DTD.

Resource File

The resource file describes the records the provider will link from and contains the information that LinkOut needs to generate links. Links described in the resource file should link directly to the resource; users should not have to perform any additional searching to access the resource after clicking the provider's link.

Resource files, links to online full text and other database content, may be submitted as an XML file, CSV file, or as a simple text file.

Resource File: XML

Files must have a file extension **.xml**; the file extension is case sensitive. The file name is assigned by the provider. File names should include alpha and numeric characters only. Spaces and special characters such as hyphens are not allowed. Examples of file names are **journals.xml**, *journaltitle*.**xml**, *resourcename*.**xml**

Note that Providers using <FileName> (see example below) need to supply a supplementary uid file, and the uid file name must be indicated in the element <FileName fieldname="uid">**filename.uid**</FileName>. This file would consist of a list of unique IDs (uid) of Entrez database records, and have the file extension .uid

File size may not exceed 20 MB. To help with file management, a provider may supply more than one resource file.

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Resource File XML Format

Note: The following format description displays the basic structure of a Resource file and includes all possible elements. Not all elements will be used in all files. Additional examples of Resource files are available for full-text providers and other resource providers.

Using ObjectSelector (standard format)

```
<?xml version="1.0" ?>
<!DOCTYPE LinkSet PUBLIC "-//NLM//DTD LinkOut 1.0//EN"
"https://www.ncbi.nlm.nih.gov/projects/linkout/doc/LinkOut.dtd">
<LinkSet>
 <Link>
   <LinkId>Identifier assigned to link by provider(required)</LinkId>
   <ProviderId>ProviderId assigned by NCBI(required)</ProviderId>
   <IconUrl>URL of icon to be displayed on database records(required)</IconUrl>
   <ObjectSelector>
     <Database>NCBI database in which links will appear(required)</Database>
     <ObjectList>
        <Query>Search retrieving records to be linked(repeatable,
        required unless <ObjId> is specified</Query>
     </ObjectList>
   </ObjectSelector>
   <ObjectUrl>
     <Base>Stable portion of URL for provider's resource(required)</Base>
     <Rule>Variable portion of URL for resource (required)</Rule>
     <SubjectType>SubjectType (optional)</SubjectType>
     <Attribute>Attribute (optional, repeatable)</Attribute>
     <UrlName>Short text string describing resource (optional)</UrlName>
```

```
      </ObjectUrl>
  </Link>
</LinkSet>
```

Using FileName (requires a supplementary uid file)

```
<?xml version="1.0" ?>
<!DOCTYPE LinkSet PUBLIC "-//NLM//DTD LinkOut 1.0//EN"
"https://www.ncbi.nlm.nih.gov/projects/linkout/doc/LinkOut.dtd">
<LinkSet>
  <Link>
    <LinkId>Identifier assigned to link by provider(required)</LinkId>
    <ProviderId>ProviderId assigned by NCBI(required)</ProviderId>
    <ObjectSelector>
      <Database>NCBI database in which links will appear(required)</Database>
      <ObjectList>
         <FileName fieldname="uid">filename.uid (file with Entrez database uids)</FileName>
      </ObjectList>
    </ObjectSelector>
    <ObjectUrl>
      <Base>Stable portion of URL for provider's resource(required)</Base>
      <Rule>Variable portion of URL for resource (required)</Rule>
      <SubjectType>SubjectType</SubjectType>
      <Attribute>Attribute (optional, repeatable)</Attribute>
      <UrlName>Short text string describing resource (optional)</UrlName>
    </ObjectUrl>
  </Link>
</LinkSet>
```

Resource File XML Prolog

The Prolog occurs once at the beginning of the file.

> **XML Declaration** *(optional)*: <?xml version="1.0"?> (required)
>
> **Document Type Declaration** *(required)***:** <!DOCTYPE LinkSet PUBLIC "-//NLM//DTD LinkOut 1.0//EN" "https://www.ncbi.nlm.nih.gov/projects/linkout/doc/LinkOut.
>
> dtd"
> [<!ENTITY icon.url "https://www.goodpublisher.com/icon/goodpublisher.jpg">
> <!ENTITY base.url "https://www.goodmedical.org/cgi/content/" >]>

The Entity Declaration, included in the Document Type Declaration, is optional. **ENTITY** may be specified to be used in the body of the file. In the above example, **ENTITY** icon.url is defined with the value "https://www.goodmedical.org/images/icon.gif", and **ENTITY** base.url is defined with the value "https://www.goodmedical.org/cgi/content/".

Once an **ENTITY** is defined in the **Prolog**, it can be used in the holding file by placing the **ENTITY** name between an ampersand (&) and semicolon (;). This alleviates the need to replicate long, textual data. In the above example, '&icon.url;' is used to represent the URL of the provider icon. Using **ENTITY icon.url** will make it easier to change the icon URL if necessary, because it will only need to be changed in one place.

Resource File XML Elements

The following lists all elements that may be included in the Resource file. Not all elements will be used in every Resource file.

LinkSet *(required)***:** Root element of the holdings file

Link *(required,repeatable)***:** An element that describes a specific set of resources grouped together by access characteristics or for convenience. A holdings file can have multiple **Link** elements. Resources that can be accessed via a single URL **Rule** are usually grouped in one **Link**. To help with file management, you may choose to put holdings in different **Link** elements, even if the same URL **Rule** applies to all holdings.

LinkId *(required)***:** An identifier assigned by a participating provider for its own reference. The **LinkId** can be any alpha-numeric string. Each **Link** within a **LinkSet** or file must have a unique **LinkId**.

ProviderId *(required)***:** The identifier number assigned to the publisher by NCBI and listed in the providerinfo.xml file.

IconUrl *(optional, repeatable)***:** The URL of the icon that will be displayed on the database records described within the **Link** element. The icon should meet the specifications described in Icons. IconUrl is repeatable as defined in the LinkOut DTD. However, this functionality is not implemented. Icons appear only in PubMed.

ObjectSelector *(required unless SubObjectSelector is specified)***:** An element containing other sub-elements in which a provider will specify which database records are being linked from by a **Link** element.

SubObjectSelector *(required unless ObjectSelector is specified):* An element containing other sub-elements in which journals and full-text providers for those journals are specified. For use by libraries and providers submitting information on behalf of libraries.

Database *(required)***:** A sub-element of **ObjectSelector** or **SubObjectSelector** that specifies the NCBI database in which the links will appear.

ObjectList *(required if ObjectSelector is specified, repeatable)***:** A sub-element of **Object Selector**, containing **Query** or **ObjId** elements, that specifies which database records the URL(s) defined in **ObjectUrl** will link from. Note that all components of a query must be valid for the query to be used for linking.

Query *(required sub-element of ObjectList unless ObjId is specified, repeatable)***:** A sub-element of **ObjectList** that contains a valid search used to select the records in the database specified in **Database** that will be linked from.

ObjId (*required sub-element of ObjectList unless Query is specified, repeatable)***:** A sub-element of **ObjectList** that contains the Unique Identifier for a database record.

FileName (*required sub-element of ObjectList. A supplementary uid file is required)***:** A sub-element of **ObjectList** that contains the file name for the supplementary uid file. For example <FileName fieldname="uid">**filename.uid**</FileName>.

ObjectUrl *(required)***:** An element that describes the information necessary for the NCBI systems to construct URLs to access the full-text for database records specified in the **ObjectList**. **ObjectUrl** contains two required sub-elements, **Base** and **Rule.**

Base *(required)***:** A sub-element of **ObjectUrl** that is the stable portion of the URL for the provider's Web-accessible resource. This can be defined as an ENTITY in the Entity Declaration. No LinkOut entities can be used in this element.

Rule *(required)***:** A sub-element of **ObjectUrl.** The **Rule** will be concatenated with the **Base** to create a valid URL when a record is retrieved from a search. Allowable Keywords in the **Rule** will be translated

into the correct values for the specific database record. The **Rule** is based on the provider's specifications for access to the resource. Links should point directly to the resource. LinkOut entities can be used in this element.

SubjectType *(optional)*: SubjectTypes are used to display resources by subject category. SubjectTypes apply to all resources identified within a **<Link>**. See Special Elements: SubjectType for the list of SubjectTypes and descriptions. If no SubjectType is given, the resource will be displayed under the category "Miscellaneous". If a SubjectType is provided in the Identity file, then it should not be included in the Resource file(s).

Attribute *(optional, repeatable)*: Attributes describe resources independent of content and describe any ownership of the information that is being claimed by the individual or organization providing the link. Attributes apply to all resources identified within a **<Link>**. See Special Elements: Attribute for the list of Attributes and descriptions.

UrlName *(optional)*: A short text string that describes a resource. UrlName is typically used when the allowed SubjectTypes and Attributes cannot meet the needs of a provider.

The resource file is specified in the LinkOut DTD.

Resource File: CSV

CSV files need to have the file extension **.csv**; the file extension is case sensitive. File names may contain alpha-numeric characters and underscores only. Special characters and spaces are not allowed. Examples of file name and extension: **linksgene2015.csv, jamafulltextlinks.csv, or linksnucleotide2015.csv**. To help with file management, a provider may submit more than one resource file. CSV files may not exceed 10 MB each.

A LinkOut program converts CSV files in to XML files that validate against the LinkOut DTD. Links provided in CSV files must link directly from a NCBI database record to the article full text, or a resource page that provides information directly related to the NCBI database record.

Resource File CSV Format and Elements

The following describes the required and optional elements of a Resource CSV file for full text providers and other resource providers. Examples can be found in the following pages: full-text providers CSV resource file, and other resource provider CSV file.

Full-text provider

Field 1: PrId (required). Provider Id assigned by NCBI to links data providers. A four-digit number.

Field 2: DB (required). NCBI database name. Enter PubMed in this field.

Field 3: UID or Query (required). Each record in an NCBI database has a numerical unique identifier (UID). The unique identifier for PubMed citations is the citation PMID. For example, in this citation: https://www.ncbi.nlm.nih.gov/pubmed/24255994 the summary display lists the PubMed citation Id (PMID) below the article citation:

Genetic screening for PRA-associated mutations in multiple dog breeds shows that PRA is heterogeneous within and between breeds.

Downs LM, Hitti R, Pregnolato S, Mellersh CS.

Vet Ophthalmol. 2014 Mar;17(2):126-30. doi: 10.1111/vop.12122. Epub 2013 Nov 21.

PMID: 24255994

Each PubMed record can also be retrieved using a query. For example, the above citation would be retrieved in PubMed using this query: "Vet Ophthalmol"[ta] AND 17[vol] AND 126[pg]

Field 4: URL (required). The URL to the article full text for a PubMed citation.

Filed 5: IconUrl (optional). URL of an icon file that you would like to represent your journal. The icon should meet the specifications described in Icons. The icon URL should point directly to the icon file in your server. If an icon is not provided, LinkOut will use the LinkOut generic icon.

Field 6: UrlName(optional). Additional description about the article link.

Field 7: SubjectType (required*). SubjectType is used to determine where links will be placed in the "LinkOut – more resources" display. In this field enter the subject type 'publishers/providers.' (*) If the 'publishers/providers' subject type is present in the identity file, this field should be left empty.

Field 8: Attribute (required). Enter "subscription/membership/fee required." If the article full text is either free or open access enter either 'Full-text online' for the full text in HTML, or 'Full-text PDF' for the full text in PDF. Note that for article full text that requires a subscription, the attribute "Full-text online" or "Full-text PDF" must be listed in the identity file.

Other resource provider

Field 1: PrId (required). Provider Id assigned by NCBI to links data providers. A four-digit number.

Field 2: DB (required). NCBI database name. Enter the name of the NCBI database for which you want to provide links data.

Field 3: UID or Query (required). Each record in an NCBI database has a numerical unique identifier (UID). For example, in this Nucleotide record: https://www.ncbi.nlm.nih.gov/nuccore/3810674 the Accession Id is shown in the record. Accession: AL032671

VERSION AL032671.1

NCBI database records can also be retrieved using queries. For example, Nucleotide query: Caenorhabditis elegans [orgn] AND 2011:2015[pdat] AND smith j [auth]

Field 4: URL (required). URL to the supplemental information page in your resource, which is directly related to the selected NCBI database record.

Filed 5: IconUrl (optional). URL of an icon file that you would like to represent your resource. The icon should meet the specifications described in Icons. The icon URL should point directly to the icon file in your server. If an icon is not provided, LinkOut will use the LinkOut generic icon. Icons are only displayed in PubMed.

Field 6: UrlName(optional). Additional description about the link.

Field 7: SubjectType (required*). In this field enter a subject type selected from this page that best describes your resource. (*) If the subject type is present in the identity file, this field should be left empty.

Field 8: Attribute (required). If access to the resource requires a license or membership, enter the following in this field: Subscription/membership/fee required. If access is free, but registration is required enter: registration required. Otherwise, if access to the resource is free and registration is not required, this field can be left empty.

Resource File: Simple Text

Files linking to resources other than full text may be submitted as a simple text file, rather than an XML file.

Files must have a file extension **.ft**; the file extension is case sensitive. The file name is assigned by the provider. File names may only include alpha and numeric characters, spaces and special characters such as hyphens are not allowed. Example file names might be **resources.ft**, *resourcename*.**ft**.

File size may not exceed 10 MB. To help with file management, a provider may supply more than one resource file.

Files submitted as text files will be translated into valid XML by LinkOut. Translated files will conform to the LinkOut DTD.

File Syntax

The file consists of blocks separated by comment lines beginning with "-":

```
------ lines starting with "-" are comments -----
------ information in the first block is global-----
prid:   [required]
dbase:  [required]
stype:  [optional]
attr:   [optional]
!base:  [optional]


------
linkid: [required - LinkOut will add a suffix to make sure it is unique]
uids:   [required if query is not present]
query:  [required if uids is not present]
base:   [required]
rule:   [required]
icon:   [optional]
name:   [optional]
stype:  [optional]
attr:   [optional]
------
```

The first block holds global information that will be used throughout the file.

> **prid:** LinkOut Provider ID

> **dbase:** NCBI database that will be hosting the links, e.g., pubmed, nucleotide, taxonomy

> **stype:** SubjectType. See Special Elements: SubjectType for all available SubjectTypes.

> **attr:** Attribute. See Special Elements: Attribute for all available Attributes.

Each subsequent block specifies a link to the provider's resource. This has two basic parts, a search query and a URL pointing back to the provider's site. Each query will be evaluated, and any database records that are retrieved will be assigned a link to the URL specified by the provider. An example of simple blocks is shown below.

```
-----
query: <species1> [name]
rule:  <http://...my_species1_page.html>
-----
query: <species2> [name]
rule:  <http://...my_species2_page.html>
-----
```

Any valid search query may be used to select records. Each query should appear on a single **query** line. Multiple query lines in one block will be OR-ed together. The following two link descriptions are equivalent:

Link Description 1:

```
-----
query: <species1> [name] OR <species2> [name]
rule:  <http://...my_species1or2_page.html>
-----
```

Link Description 2:

```
-----
query: <species1> [name]
query: <species2> [name]
rule:  <http://...my_species1or2_page.html>
-----
```

Objects in each NCBI database are indexed by a numerical unique identifier. For example, taxid in taxonomy, pmid in PubMed. You can specify the database records you would like to link from by listing them directly with the **uids:** line.

Link description with uids:

```
--- separate unique identifiers (UIDs) with a blank space.---
---Each new line of UIDs should start have the "uids" label---
uids: 123456 123469 3847559
uids: 4755983 2197866
rule:  <http://...my_species1or2_page.html>
-----
```

The optional fields allow you to customize your links in several ways.

> **icon:** URL of an icon file that you would like to represent your link and resources. Only applicable to links in PubMed.

> **name:** Additional description about the link.

> **stype:** SubjectType. See Special Elements: SubjectType for all available SubjectTypes.

> **attr:** Attribute. See Special Elements: Attribute for all available Attributes.

Special Elements: SubjectType

The <SubjectType>, <Attribute>, and <UrlName> elements are used to organize and describe resources in the database displays and to facilitate access to these resources by defining them as groups.

SubjectType is used to group resources in the LinkOut Display, making it easier to browse through available LinkOut resources. In most cases, resources are grouped by Subject Category.

Only one SubjectType should be applied to each Link. If no SubjectType is specified for a Link, it will be displayed under the heading "Miscellaneous".

SubjectTypes are also used in My NCBI, allowing users to display records with links to resources from a specific SubjectType or Subject Category as a filter, and to activate icons for these links.

SubjectType can be used in searches to retrieve records with links to resources from a specific SubjectType.

To do this, enter the following in the search box.

> **losubjt*SubjectTypeName* [sb]**
> Replace ***SubjectTypeName*** with the SubjectType name from the list below.

This filter can be used as a part of any NCBI database search.

SubjectType Categories

SubjectTypes are grouped into the following categories:

- Chemical Information
- Education
- Funding Sources
- Literature
- Medical
- Molecular Biology Databases
- Research Materials
- Researchers
- Tools

Note: Category headings CANNOT be used in the the <SubjectType> element.

Chemical Information

biological properties: Information about chemicals with biological activity.

chemical libraries: Link to libraries of chemicals provided by depositors, for example screening centers.

imaging agents: Information on radionuclide-containing chemicals which bind to specific sites/molecules and help to detect motion/binding.

metabolism: Information about chemicals participating in metabolism.

molecular interactions: Information about chemicals which interact or bind to other molecules (for example, protein-protein or small molecule-protein interactions)

physical properties: Information about chemicals with determined physical properties.

reactions: Information on chemicals which used as reactants/products/intermediates/catalysts.

theoretical properties: Information about chemicals with calculated properties.

toxicology: Information on chemicals investigated for their toxic effect.

vendors: Information from commercial distributors of chemicals.

Education

These SubjectTypes describe links from NCBI database records to resources offering educational content, as well as those providing information about educational opportunities.

conferences/meetings/workshops: Resources offering announcements of, or information on upcoming scientific conferences, meetings, and workshops relevant to the subjects of specific database records.

glossaries/dictionaries: Resources offering glossaries or dictionaries of technical terminology or other specialized vocabularies used in research relevant to specific database records.

online tutorials/courses: Resources offering information about or providing Web-based primers, tutorials, or courses on specialized areas of research relevant to specific database records.

Funding Sources

The SubjectType in this category describes links to resources within information on funding for research.

funding sources: Resources providing information on locating, applying for, or obtaining funding for particular areas of research relevant to the subjects of specific database records.

Literature

These SubjectTypes describe links to literature databases and resources from NCBI databases records (typically PubMed records).

SubjectTypes under the "Literature" category appear in PubMed as follows:

- Resources from "individual online article", "publishers/providers" are grouped under the heading "Full Text Sources".
- The SubjectTypes: "books", "document delivery", "images", and "supplemental materials" are displayed under the heading "Other Literature Sources".

aggregators: Services that provide a single point of online access to multiple full-text publications cited in NCBI database records. "aggregators" are differentiated from "publishers/providers" (see below) by their aggregation of online access to the publications of multiple publishers and/or providers.

books: Links to relevant information in a book.

commentaries/discussion: Links to commentaries or discussion to extend/continue the topic discussed in the article cited in a PubMed citation.

images: Links to online images from the NCBI database records that they are relevant to or referenced by.

institutional repository: Links to materials, such as datasets or full text documents, deposited to an online archive of an institution.

patent databases: Links to patent database records from PubMed citations of publications discussing patented products (including proteins and DNA sequences) or processes, or from relevant NCBI database records.

publishers/providers: Links to online full-text articles offered by publishers or their agents.

supplemental materials: Links to the materials directly supporting the research discussed in the cited article, including data sets from experiments/studies accessory graphics, images, sound, and multimedia files related to the article.

systematic reviews: Links to reviews including systematic reviews of controlled trials.

Medical

These SubjectTypes describe links from NCBI database records to relevant online medical resources.

clinical trials: Links from NCBI database records to resources providing information about relevant ongoing and upcoming clinical trials, including information on locating, applying to, or participating in clinical trials.

consumer health: Links from NCBI database records to relevant resources or materials intended to educate or inform the general public about health topics or issues.

diagnostics: Resources providing information on the signs, symptoms and diagnosis of diseases, syndromes, or conditions relevant to specific NCBI database records.

disease organizations: Institutions, groups, or other organizations whose work is focused on the research of diseases or conditions, or that offer information, support, and/or other resources to people suffering from diseases or conditions, linked from relevant NCBI database records.

medical equipment and devices: Organizations or companies providing medical equipment or other medical devices relevant to specific NCBI database records.

pharmacology: Resources providing information on the pharmacological aspects of substances relevant to specific NCBI database records.

treatment guidelines: Resources offering treatment guidelines or information on treatment guidelines for diseases, syndromes, or conditions relevant to specific NCBI database records.

Molecular Biology Databases

These SubjectTypes describe links from NCBI database records to corresponding or related records in other online molecular biology databases.

DNA/protein sequence: Databases providing nucleotide or amino acid sequence data.

gene/protein/disease-specific: Databases providing data specific to genes, proteins, diseases, syndromes, or conditions.

gene expression: Databases providing data on gene expression (e.g., RNA transcription, knockouts).

locus-specific: Databases, often described as LSDB, focusing on a single gene or a small family of genes.

mapping: Databases providing chromosomal mapping data, such as sequence tagged site (STS) mapping.

meta-databases: Databases that draw and/or synthesize information from other databases and extend or add value to the original information.

organism-specific: Databases providing data specific to an organism or group of organisms.

population/variation: Databases providing data on sequence variation within populations, including mutations or other polymorphisms.

protein interactions/pathways: Databases that describe molecular interactions and/or biological pathways.

structure: Databases providing structural or pattern data, such three-dimensional protein structures, chemical structures, or two-dimensional electrophoresis patterns.

taxonomy/phylogenetic: Databases providing data on organism taxonomy, phylogenetic trees and relationships, or biodiversity.

Research Materials

These SubjectTypes describe links to relevant research material suppliers from NCBI database records that discuss the use of these materials.

clones/clone libraries: Suppliers providing DNA clones and clone libraries (e.g., DNA, cDNA).

culture/stock collections: Suppliers providing cell cultures.

herbarium/museum collections: Curated plant/animal specimen collections

laboratory equipment: Suppliers providing laboratory equipment.

oligonucleotides: Suppliers providing equipment, materials, and reagents used in researching oligonucleotides.

other reagents: Suppliers providing other reagents not described by the SubjectTypes above.

Researchers

These SubjectTypes describe links from NCBI database records to the individuals or organizations that conducted or supported the research cited therein.

colleges/universities: Colleges, universities or other academic institutions that have conducted or supported research cited in NCBI database records.

companies/research institutes: Private companies or research institutions that have conducted or supported research cited in NCBI database records.

directories: Links to the directory entries of individuals or organizations from NCBI database records that cite research conducted or supported by those individuals or organizations.

individuals: The web pages of individuals who have conducted research cited in NCBI database records.

societies/associations: Societies or organizations that have conducted or supported research cited in NCBI database records.

Tools

These SubjectTypes describe links to research tools, utilities or other software from NCBI database records citing research that discusses or requires the use of these tools.

3D structure prediction/functional modeling: Tools used in predicting the three-dimensional structure of proteins or in modeling protein function.

primer design: Tools used in the design of nucleotide primer sequences for use in polymerase chain reactions.

protein identification/characterization: Tools used in the identification, annotation, characterization, or other description of proteins.

restriction mapping: Tools used in the mapping of restriction enzyme cutting sites.

sequence screening/similarity/alignment: Tools used in screening, comparing, matching, and alignment of sequences.

sequence viewer: Tools used in creating visual representations of nucleotide or amino acid sequences.

translation: Tools used in the translation of sequences or of sequence file formats.

Special Elements: Attribute

The <SubjectType>, <Attribute>, and <UrlName> elements are used to organize and describe resources in the NCBI database displays and to facilitate access to these resources by defining them as groups.

The Attribute element is used to provide information about the resource itself, independent of content. It describes the format, barriers to access, and the ownership (if any) of the resources being linked. Based on the information provided by Attribute, users can make an informed choice from a list of LinkOut resources available. For example, they will know if a resource is free before clicking the link.

Attributes can be used in database searches to retrieve records with links to resources with a specific Attribute.

To do this, enter the following in the search box.

> **loattr*AttributeName* [sb]**
> Replace ***AttributeName*** with the Attribute name from the list below.

This filter can be used as a part of any NCBI database search.

Special aliases are also available for these searches:

> Full text [sb]
>
> Free full text [sb]

For each resource, the provider should select all Attribute values from the list below that apply and include them in the appropriate LinkOut files.

Attribute Categories

Attributes are grouped in the following categories:

> Barriers
> Ownership
> Resource Form
> Miscellaneous

Barriers

These Attributes describe barriers to accessing the information being linked to from a database record.

registration required: A free registration is required to access the information being linked. If any expense is involved, please use the Attribute "subscription/membership/fee required". Citations with this Attribute will be marked as "Registration required" in the LinkOut links.

subscription/membership/fee required: Membership in an organization, a subscription, or some other fee or expense is required to obtain access to the information being linked.

If no Barrier Attributes are used, citations will be marked as "Free" in the LinkOut links.

Ownership

These Attributes describe any ownership of the information that is being linked claimed by the individual or organization providing the link.

author of URL: The individual or organization providing a link is the author of the information that is being linked.

publisher of information in URL: The individual or organization providing a link is the publisher of the information that is being linked.

Resource Form

These Attributes describe the form of the documents being linked from NCBI database records.

full-text online: Full-text documents that are in text, HTML, word processor, or other formats (besides PDF or PostScript).

full-text PDF: Full-text documents that are in Adobe Portable Document Format (PDF).

full-text PostScript: Full-text documents that are in PostScript format.

order form: Order form for the resources mentioned in the database record, e.g. clones.

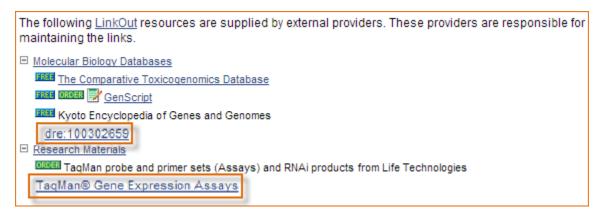## Miscellaneous

Attribute not included in other categories:

preference: When duplicate URLs are submitted for the same database record but different IconUrl, SubjectType, and/or Attributes are assigned, use **preference** to indicate which link should be displayed. See Duplicate Links for details.
When a provider submits multiple, unique, URLs for a PubMed record, the provider should use **preference** to indicate which URL should be linked through their icon in PubMed. See Multiple Links for details.

Special Elements: UrlName

UrlName is a short text string used to describe a resource. If possible, <SubjectType> and <Attribute> should be used, rather than UrlName. UrlName should be used only when the allowed terms in the SubjectType and Attribute lists do not suffice to describe the resource. UrlName is not searchable.

When UrlName is used, it will appear in the LinkOut Display. In the example below from the Gene database LinkOut display, the two providers Kyoto Encyclopedia of Genes and Genomes and TaqMan have used UrlName to provide additional information about the resource being linked. The link appears as the description given in UrlName. The first provider has not used UrlName, so the link appears as the resource name.

Allowable Rule Keywords

As in all XML files, entities can be defined and used in LinkOut files to facilitate file construction.

There are several pre-defined Linkout entities (Allowable Rule Keywords) in the LinkOut DTD. When an entity is used in the <Rule> element, the NCBI system will replace the entity with the corresponding value from each NCBI database record when constructing the URL specified in your <Rule>. Note that LinkOut entities cannot be used in the <Base> element or other elements in a LinkOut file.

The following is a list of entities and the values with which they will be substituted:

Entity	Corresponding value from NCBI database record
&lo.id;	Unique identifier (PMID, TaxID, etc.)

For PubMed only:

Entity	Corresponding value from NCBI database record
&lo.auth;	First Author. Example: Smith JE.
&lo.authln;	First Author Last Name. Example: Smith.
&lo.day;	Two-digit day of the publication date. Example: 01; 31.
&lo.doi;	Article DOI. Must be submitted by Publisher.
&lo.eday;	Two-digit day of electronic publication date. Example: 01; 31.
&lo.emo;	Two-digit month of electronic publication date. Example: 01; 12.
&lo.emon;	Three-letter month abbreviation of electronic publication date. Example: Sep.
&lo.emonth;	Month of electronic publication date. Example: September.
&lo.eyear;	Four-digit year of electronic publication date. Example: 1998.

Table continued from previous page.

Entity	Corresponding value from NCBI database record
&lo.eyl;	Last digit of year of the electronic publication date. Example: 1999 =9.
&lo.eyr;	Last two digits of year of electronic publication date. Example: 98; 00.
&lo.essn;	Journal electronic ISSN code.
&lo.iss;	Journal issue.
&lo.issn;	Journal print ISSN code.
&lo.issnl;	Journal print ISSN code with the dash stripped.
&lo.jtit;	Journal title (NLM's Title Abbreviation).
&lo.mo;	Two-digit month abbreviation of the publication date. Example: 01.
&lo.mon;	Three-letter month abbreviation of the publication date. Example: Sep.
&lo.month;	Month of the publication date. Example: September.
&lo.otit;	Article title.
&lo.page;	First page.
&lo.pii;	Publisher Item Identifier. Must be submitted by journal publishers.
&lo.vol;	Journal volume.
&lo.year;	Four-digit year of the publication date. Example: 1998.
&lo.yl;	Last digit of year of the publication date. Example: 1999 =9.
&lo.yr;	Last two digits of year of the publication date. Example: 98.

For Sequence databases (Nucleotide, Protein, Structure, Genome):

Entity	Corresponding value from NCBI database record
&lo.pacc;	Primary accession for sequences.

For Taxonomy only:

Entity	Corresponding value from NCBI database record
&lo.scientificname;	Scientific name. Example: "Homo sapiens neanderthalensis"

For UniGene only:

Entity	Corresponding value from NCBI database record
&lo.clusterid;	Cluster Id.

Special Characters

XML requires certain special characters to be encoded in the files. When using the following characters in LinkOut files, *except in LinkOut entities*, please encode them as shown.

Character	XML Encoding
&	&
<	<
>	>

Table continued from previous page.

Character	XML Encoding
©	©
®	®
™	™

Do not use ASCII encoding in LinkOut files.

Transferring Files via FTP

Providers must write to linkout@ncbi.nlm.nih.gov to apply for inclusion in LinkOut before submitting files.

LinkOut files are submitted to NCBI via FTP. The following file name conventions apply:

- File names may include alpha and numeric characters only. Spaces and special characters such as hyphens are not allowed.
- Identity and Resource files must have the file extension ".xml". The exception is resource files submitted as a simple text file.
- Identity files must be named "providerinfo.xml".

File Placement

- Resource provider files (both full-text and other providers) are placed in the "holdings" directory of the FTP account.
- "doi" or "pii" files are placed in the "pid" directory.

Files placed in an incorrect directory will not be processed.

How to FTP

From a standard ftp client:

1. At a command prompt type: ftp-private.ncbi.nlm.nih.gov and press enter.
2. Type your login name at the login prompt and press enter. (See how to obtain ftp account from NCBI.)
3. Type your password at the password prompt and press enter.
4. You should now be logged into the ftp server. If you receive an error message, check your login information, type 'bye' followed by enter, and retry steps 1-3.
5. Type 'bin' and press enter. This changes your ftp server to BINARY mode.
6. Type 'cd [directory, i.e. holdings, users]' and press enter. This changes your current directory.
7. Type the 'put' command, followed by your pathname or drive and filename and press enter. (For example, 'put C:\filename' or 'put /home/testfiles/journalv6n3'.)
8. Type 'dir' and press enter to display the files in the current directory.
9. Type 'bye' to disconnect from the server and close the ftp session.