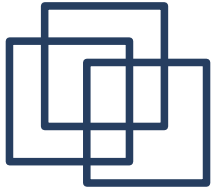


Minimal GDS II

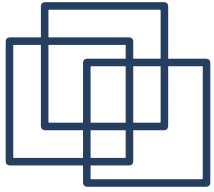
A minimalist overview of the GDS II
data file format

Ulf Griesmann, NIST, November 2011



Elements, Structures, Libraries

- The basic building blocks of GDS files are elements.
Elements can have the following types:
 - boundary (a simple, closed polygon)
 - path
 - node
 - text
 - box (not used for lithography layouts)
 - structure reference (sref)
 - array reference (aref)
- All elements **must** be contained in user-defined structures (cells), which are identified by a **unique name**.
- Structures are combined into a library file (GDS file). A GDS file must contain at least **one top level structure**.

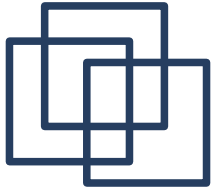


Sref and Aref

Structure references (sref's) and array references (aref's) are special elements that embed structures inside other structures.

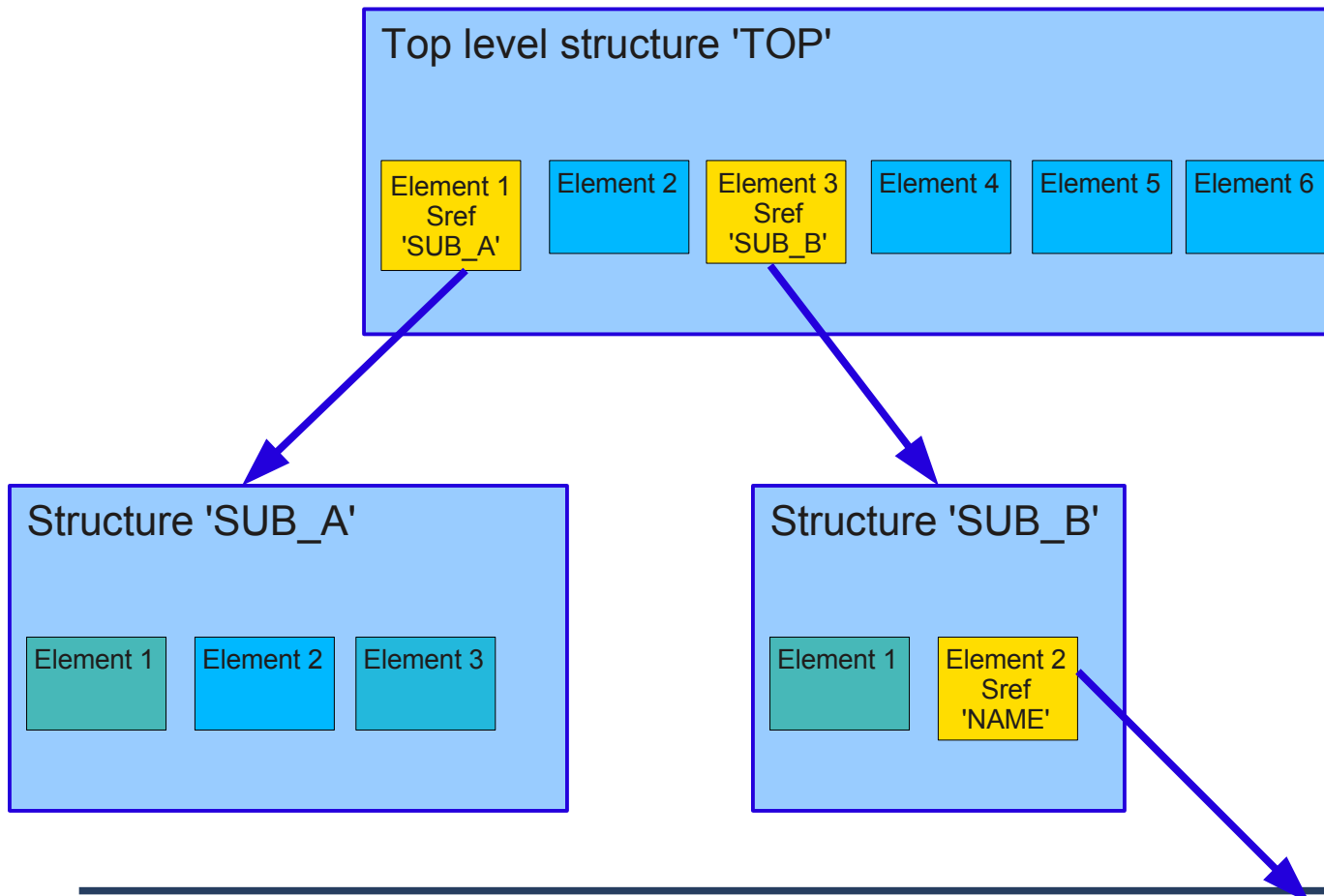
Structures are referenced by their names.

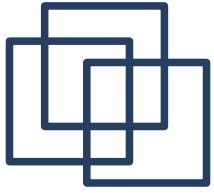
- A structure reference, sref, embeds the referenced structure at a user-defined location in a user-defined orientation. The referenced structure can itself contain references to other structures, etc.
- An array reference, aref, embeds the referenced structure, replicated on a rectangular grid, at user-defined location with user-defined orientation. The referenced structure can itself contain references to other structures.



Hierarchies

sref and aref elements give GDS files the power to describe structure hierarchies and hierarchical layouts. For example:





Grouping

In addition to the hierarchical layout description using sref and aref elements, GDS files have several ways of grouping of elements.

- **Layers:** all elements (except sref and aref) must be assigned a layer number & data type pair. In the context of lithography the meaning of the layer number is obvious.
- **Plexes:** provide a way of grouping elements by assigning them a plex number thus forming plex groups of elements. Provides, e.g., a means for grouping elements by their function.
- **Properties:** elements may be assigned a property/name pair which is another way of grouping elements. Properties may e.g. be used to distinguish metal layers from dielectric layers in a layout.