The language supports formal definition of information entities, their attributes and constraints (rules), and the relationships between the information entities in a computer-processible form. The language may also be used for the more traditional entity-relationship, data modeling.

The following is the current PDES definition of an edge and its relationship with a vertex, as defined in the Express language.

**ACTUAL ENTITY EDGE SUB-TYPE OF (TOPOLOGY):**

\[
\begin{align*}
\text{EDGE}_\text{START} & : \text{VERTEX}; \\
\text{EDGE}_\text{END} & : \text{VERTEX}; \\
\text{EDGE}_\text{CURVE} & : \text{OPTIONAL CURVE}_\text{SEGMENT STRUCTURE}; \\
\end{align*}
\]

WHERE

\[
\begin{align*}
\text{EXTENT} (@) & > 0; \\
\text{EXTENT} (@) & < 1; \\
\end{align*}
\]

(* Edge extent is finite and non-zero *)

\[
\begin{align*}
\text{DIMENSIONALITY} (@) & = 1; \\
\text{ARCHWISE CONNECTED} (@) & ; \\
\text{MANIFOLD} (@) & ; \\
\end{align*}
\]

(* Edge is an arcwise connected manifold topological curve *)

END_ENTITY;

**LINK VERTEX_EDGE**;

**OF**

\[
\begin{align*}
\text{HAS-ENDPOINT-AT-VERTEX} & : \text{EDGE}; \\
\text{IS-ENDPOINT-OF-EDGE} & : \text{VERTEX}; \\
\end{align*}
\]

WHERE

\[
\begin{align*}
\text{IS-ENDPOINT-OF-EDGE} & \not\in (\text{EXTENT (HAS-ENDPOINT-AT-VERTEX)}); \\
\end{align*}
\]

(* The extent of an Edge does not include its bounds *)

\[
\begin{align*}
\text{SIZEOF} (\text{HAS-ENDPOINT-AT-VERTEX}) & \geq 0; \\
\end{align*}
\]

(* Multiple edges can reference the same vertex *)

\[
\begin{align*}
\text{SIZEOF} (\text{IS-ENDPOINT-OF-EDGE}) & = 1 \text{ OR} \\
\text{SIZEOF} (\text{IS-ENDPOINT-OF-EDGE}) & = 2; \\
\end{align*}
\]

(* The same vertex can be used for both EDGE_START and EDGE_END *)

\[
\begin{align*}
\text{DISTANCE (HAS-ENDPOINT-AT-VERTEX, IS-ENDPOINT-OF-EDGE)} & = 0; \\
\end{align*}
\]

(* Vertex geometry must be consistent with Edge geometry *)

END_LINK;

The PDES specification itself will be published with the Integrated Product Information Model defined in the Express language. One or more mappings from this model to particular computer-exchange data forms will also form part of the published document. The expectation is that the information model will not change, although it will expand to accommodate new application areas, while the implementation technologies will be more volatile.

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**References**

1. P.R. Wilson, "Information and/or Data?" CG&SA, Nov. 1987, pp. 56-61.

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**DUKE UNIVERSITY Department of Computer Science**

The DUKE UNIVERSITY Center of Computer Science, the recipient of a NSF CER Grant, has junior faculty positions available for the 1988-89 academic year in theoretical computer science and scientific computing. Applicants must demonstrate excellence in research or exhibit the promise of excellence.

The department currently has 17 tenure track faculty, approximately 200 undergraduate majors and 70 graduate students pursuing masters and/or doctoral degrees.

The department has major research efforts in scientific computing with emphasis on numerical linear algebra, the solution of PDEs, and VLSI simulation; computer systems with emphasis on computer architectures, modeling of fault-tolerant systems, systems performance, and communications; artificial intelligence, particularly in the areas of natural language interface, search methodologies, and expert systems; and theory and algorithms with emphasis on combinatorial and graph-theoretic studies. Specific areas of the research efforts come from the areas of medical applications (in collaboration of the Duke Medical Center), and VLSI (in collaboration with the Microelectronics Center of N.C.), of which Duke is a Participating Institution.

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