# Tracer Schema

Entities:

* Run
* File
* Class
* Function
* Operation
* Variable

Entity Definitions:

* A file is the basic container of a programming project containing all other entities.
* A class is an encapsulation entity in a programming project that represents the template of an object.
* A function is a block of operations that may be referenced elsewhere in the project.
* An event may be considered any of the following: variable declaration, variable assignment, function call, expression evaluation, and jumps.
* A variable is a reservation of space in memory.

Entity Relationships:

A run may contain zero to many events.

A file may contain zero to many classes.

A file may contain zero to many functions.

A file may contain zero to many events.

A file may contain zero to many variables.

A class belongs to one and only one file.

A class may contain zero to many functions.

A class may contain zero to many variables.

A function belongs to one and only one file.

A function may belong to zero or one class.

A function may contain zero to many events.

A function may contain zero to many variables.

An event belongs to one and only one run.

An event belongs to one and only one file.

An event belongs to one and only one class.

An event may involve zero to many variables.

A variable belongs to one and only one file.

A variable may belong to zero to one class.

A variable may belong to zero to one function.

A variable may be contained in zero to many events.

Entity Attributes:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Run | File | Class | Event | Function | Variable |
| RunID  DateTime  RealTime  UserTime  SystemTime  InputArray  OutputArray | FileID  Name  Project  Type | ClassID  FileID  Name  Type | EventID  RunID  FileID  ClassID  Line#  Type  ExecutionTime | FunctionID  FileID  ClassID  Name  ReturnType  Parameters | VariableID  FileID  ClassID  Name  DataType  DataModifier  Scope |

Events:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| VariableDeclaration | VariableAssignment | FunctionCall | ExpressionEvaluation | JumpStatement |
| EventID  VariableID | EventID  VariableID  ValueAssigned | EventID  FunctionID  UseType | EventID  ExpressionType  ExpressionResult  UseType | EventID  JumpType  ResultingLine |

Normalized Relational Entity to Support many-to-many relationship between Event and Variable:

|  |  |
| --- | --- |
| EventVariable | Variable\_History |
| EventID  VariableID  EventType | VariableID  EventID  PreviousValue  NewValue |