Data flow style: Pipe and Fitter

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| Over view | The pattern of interaction in the pipe-and-filter style is characterized by successive transformations of streams of data. Data arrives at a filter’s input ports, is transformed, and then is passed via its output ports through a pipe to the next filter. A single filter can consume from, or produce data to, multiple ports |
| Element | * Filter: A component that transforms data read on its input ports to data written on its output ports. Filters typically execute concurrently and incrementally. Properties may specify processing rates, input/output data formats, and the transformation executed by the filter. * Pipe: A connector that conveys data from a filter’s output ports to another filter’s input ports. A pipe has a single data-in and a single data-out role, preserves the sequence of data items, and does not alter the data passing through. Properties may specify buffer size, protocol of interaction, and data format that passes through a pipe |
| Relations | The attachment relation associates filter output ports with data-in roles of a pipe, and filter input ports with data-out roles of pipes. |
| Computational Model | Data is transformed from a system’s external inputs to its external outputs through a series of transformations performed by its filters |
| Constraints | * Pipes connect filter output ports to filter input ports. * Connected filters must agree on the type of data being passed along the connecting pipe. * Specializations of the style may restrict the association of components to an acyclic graph or a linear sequence, sometimes called a pipeline. * Other specializations may prescribe that components have certain named ports, such as the stdin, stdout , and stderr ports of UNIX filters. |
| What It’s For | * Improving reuse due to the independence of filters * Improving throughput with parallelization of data processing * Simplifying reasoning about overall behavior |
| Example | * Pipes, a composition tool that lets Web users combine simple functions quickly and easily into pipe-and-filter applications that aggregate and manipulate content from around the Web * The basis of Yahoo! Pipes is the many RSS feeds available from sites on the Internet. These data streams form the input to the applications that users build, applications that combine and manipulate the data in the streams to form useful results |