Doodlebase Schema

Introduction to Doodlebase Schema

A schema is a map, or model, that transforms data into information. Doodlebase's schema is for storage and reporting on production data, and can be mapped to nearly any manufacturing process.

The flexibility of the Doodlebase schema is achieved through "multi-dimensional data modeling." Multi-dimensional schemas are powerful because they structure your data across many dimensions that can be flattened into any view or report, based off the report you want to see. Doodlebase allows you to harness the power of a multi-dimensional schema without needing to understand how they are built or how they work. This is achieved through **Route Designer**, a graphical interface that allows you to define your business process.

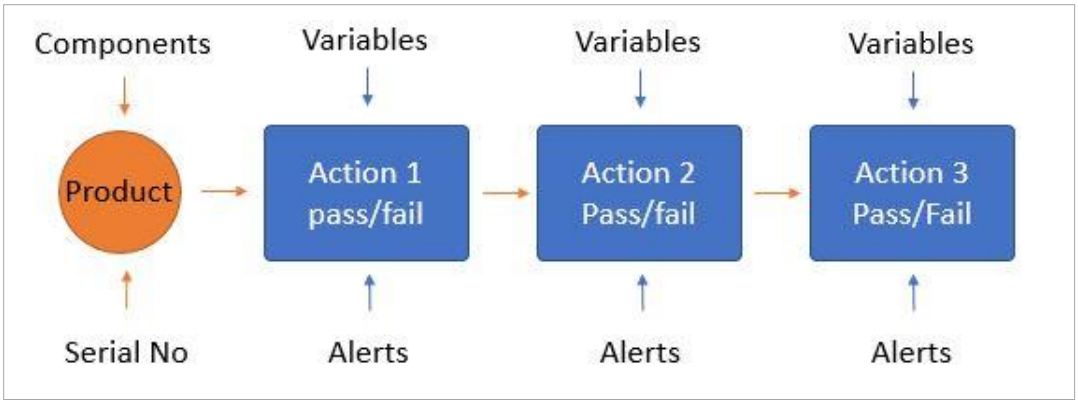
Once you define your business process, a multi-dimensional database is generated for you. After reading this document, you will understand how to build a business process that can be read by Doodlebase using the **Doodlebase Route Designer,** and will be ready to send data to your database.

Products, Actions, & Routes

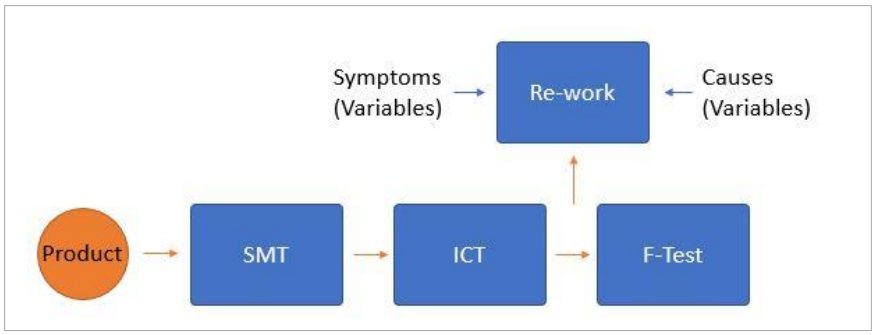
The Doodlebase schema is centered around the concepts of **products**, **actions,** and **routes**. A product (noun) is a thing that's being manufactured, and an action (verb) is an action that occurs on the product (such as a circuit test). Products contain information related to the product such as *serial number*, *components*, and *name* while actions contain information related to the specific action the product went through such as a test action with *pass/fail*, *time*, and *parameter measurements.*

To build your schema, you define a series of actions you want to capture, and you send your product through those actions. A series of related actions is called a route. A route mirrors a manufacturing process, where a product moves through a series of steps in a production line.

Sample Route



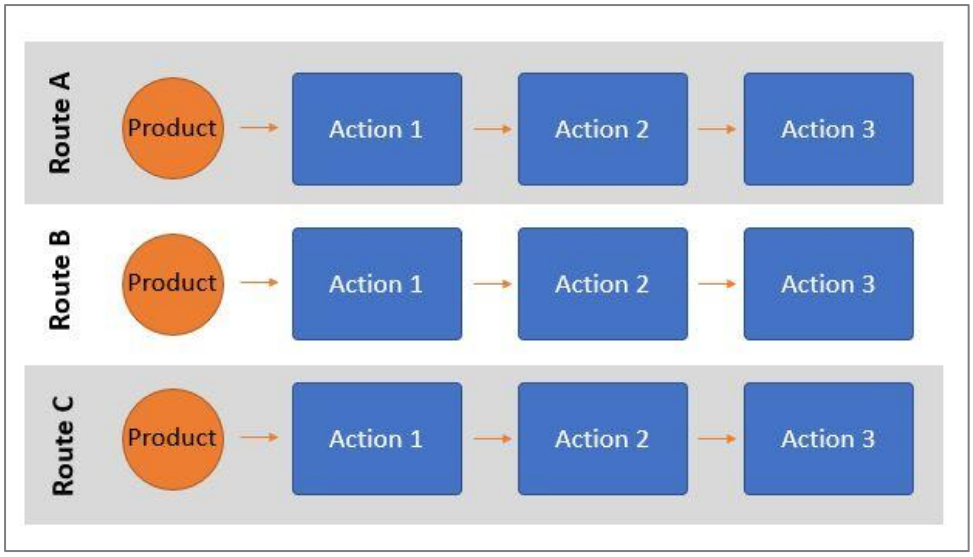
Optional Actions



You may wish to set up optional actions within your route. For example, the REWORK action will only be captured if a product fails a test and is sent to a rework station.

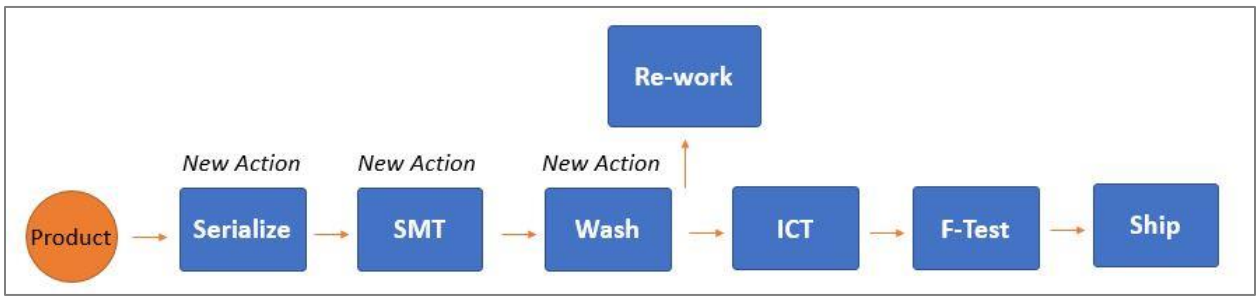
Routes & Actions

You may also wish to set up multiple routes within your database to reflect multiple production lines or products being manufactured. Each route can have its own unique actions to reflect the processes it moves through.



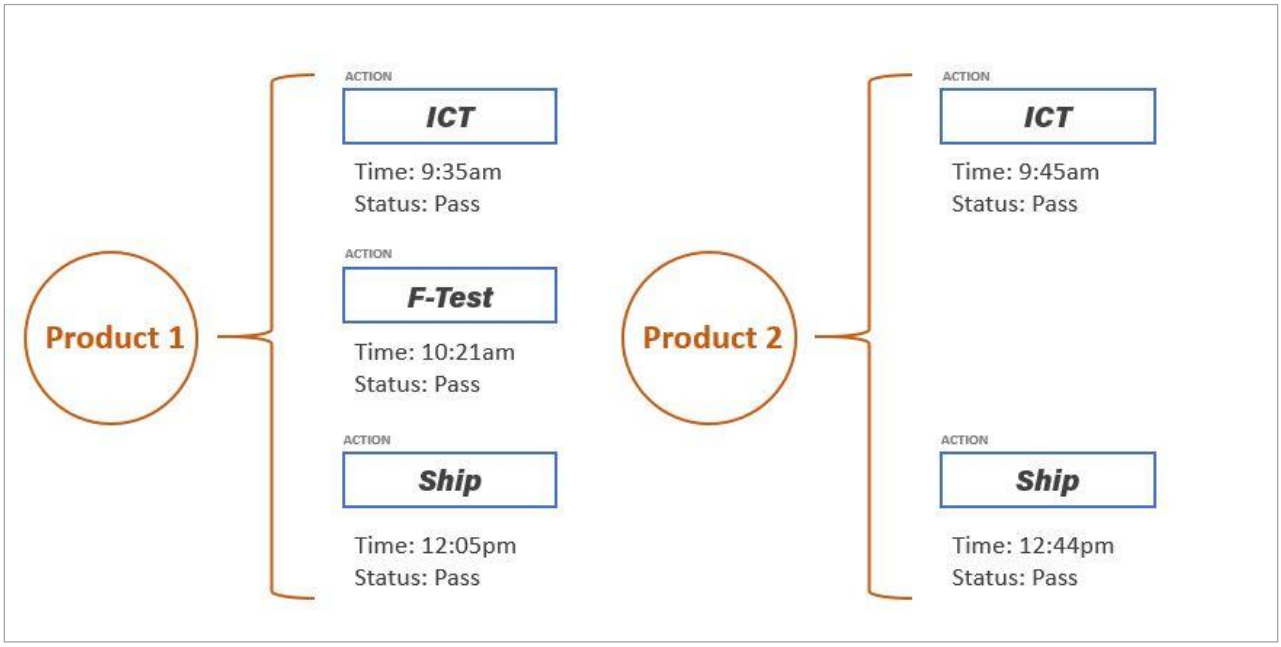
Expanding your routes

As you become more familiar with Doodlebase, you may wish to expand your routes to gain a stronger view on your manufacturing process. The Doodlebase schema can easily adapt to new actions you add to your routes such as *Serialize, SMT, & Wash*.



Route History

In the world of manufacturing, there is no guarantee that a product moved through it's intended route. Sometimes, a product many skip a step, or could be sent through a route in the wrong order. With Doodlebase, you can examine a product's history to determine its actual manufacturing path.



In the example above, Product 2 was shipped even though it was never sent through Functional Test. Understanding whether a product moved though it's intended actions and the value of the actions is something you can examine as you construct your custom reports.

Route Data

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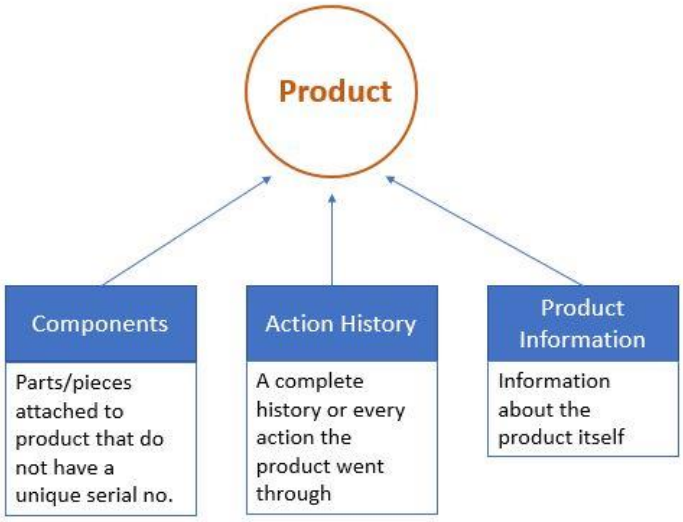
	Process	Schema	Manufacturer	Location	Client	Verified	Sync Status	Report Status	Status	User Role
1	Serialize_Board	Product	Perfect Systems	Suzhou	ScanClient	☑	☑	☑	☑	Reports
2	SMT-Bottom	Product	Acme Products	Suzhou	SMT Line2 B	☑	☑	☐	☑	Reports
3	Wash-Bottom	Product	Acme Products	Suzhou	Wash Line2 B	☑	☑	☐	☑	Reports
4	SMT_Placement	Product	Perfect Systems	Suzhou	Fuji	☑	☑	☑	☑	Reports
5	Wash	Product	Perfect Systems	Suzhou	WashTracker	☑	☑	☑	☑	Reports
6	Hand-Solder	Product	Acme Products	Suzhou	HS Station 1	☑	☑	☐	☑	Reports
7	Wash	Product	Acme Products	Suzhou	Wash Line2 H	☑	☑	☐	☑	Reports
8	ICT	Product	Perfect Systems	Suzhou	ICT1	☑	☑	☑	☑	Reports
9	ICT	Product	Perfect Systems	Suzhou	ICT2	☑	☑	☑	☑	Reports
10	ICT	Product	Perfect Systems	Suzhou	ICT3	☑	☑	☑	☑	Reports
11	ESS	Product	Perfect Systems	Suzhou	Chamber1	☑	☑	☑	☑	Reports
12	ESS	Product	Perfect Systems	Suzhou	Chamber2	☑	☑	☑	☑	Reports
13	ESS	Product	Perfect Systems	Suzhou	Chamber3	☑	☑	☑	☑	Reports
14	Final_Test	Product	Perfect Systems	Suzhou	AcmeTester1	☑	☑	☑	☑	Reports
15	Final_Test	Product	Perfect Systems	Suzhou	AcmeTester2	☑	☑	☑	☑	Reports
16	Rework	Product	Acme Products	Suzhou	Rework	☑	☑	☐	☑	Reports
17	ORT	Product	Acme Products	Suzhou	LifeTest2	☑	☑	☐	☑	Reports

Route Designer

You can create your own routes in Doodlebase using the Doodlebase Route Designer. The image on the left shows a route made up of 17 process steps, representing the capture of an entire manufacturing process.

Product & Action

Now that we have a high-level view of the Doodlebase product/action/route system, it's time to dive into how to map your manufacturing data to Doodlebase's product/action schema.



What is a Product?

A product represents a serializable device/item/widget being manufactured that you wish to capture information on. A product is made up of *components, actions, and information.*

Product Information

Product information is information that defines a product. In Doodlebase, you can define your product with the following parameters:

Product Information		
Name	Description	Required?
Serial Number	Serial number of the product	Yes
Part Number	Common name of the product	No
Work Order	Work order attached to the product	No
Parent Serial Number	If product is attached to a parent	No

Components

Components are parts/pieces that are attached to a product. Components may or may not have a serial number and are defined by the following parameters:

Components		
Name	Description	Required?
Serial Number	Serial number of Component	No
Parent Serial Number	Serial number of product attached to	Yes
Creation Date	Date component was created	No
Part Number	Part number of component	No
Manufacturer	Component manufacturer	No
Lot Code	Code of the product lot	Yes
Date Code	Date Code associated with lot	Yes

Actions

A product moves through actions as it progresses along the production line. An action is something that happened on a product that you are interested in measuring. An action could be an In-Circuit Tester performing a test on an electronic product. You can add any data you'd like to an action to capture a full understanding of what happened. There are three categories of action data:

- **Variables:** numeric based measurements
- **Attributes:** non-numeric based measurements
- **Files & Folders:** Photos, videos, documents, etc.

Variables

A variable is a type of measurement that can be attached to an action. A variable is made up of the following parameters:

Variable		
Name	Description	Required?
Name	Name of the variable	Yes
Category	(optional) Category of variable	No
Unit	Unit of the variable (ex "ohms")	Yes
USL	Upper spec limit	Yes
LSL	Lower spec limit	Yes
Creation Date	Date/Time of capture	Yes
Value	Value of the variable	Yes
Status	Pass/Fail status of the variable	Yes

Attributes

An attribute is a non-numeric measurement that is associated with an action. An attribute is made up of the following parameters:

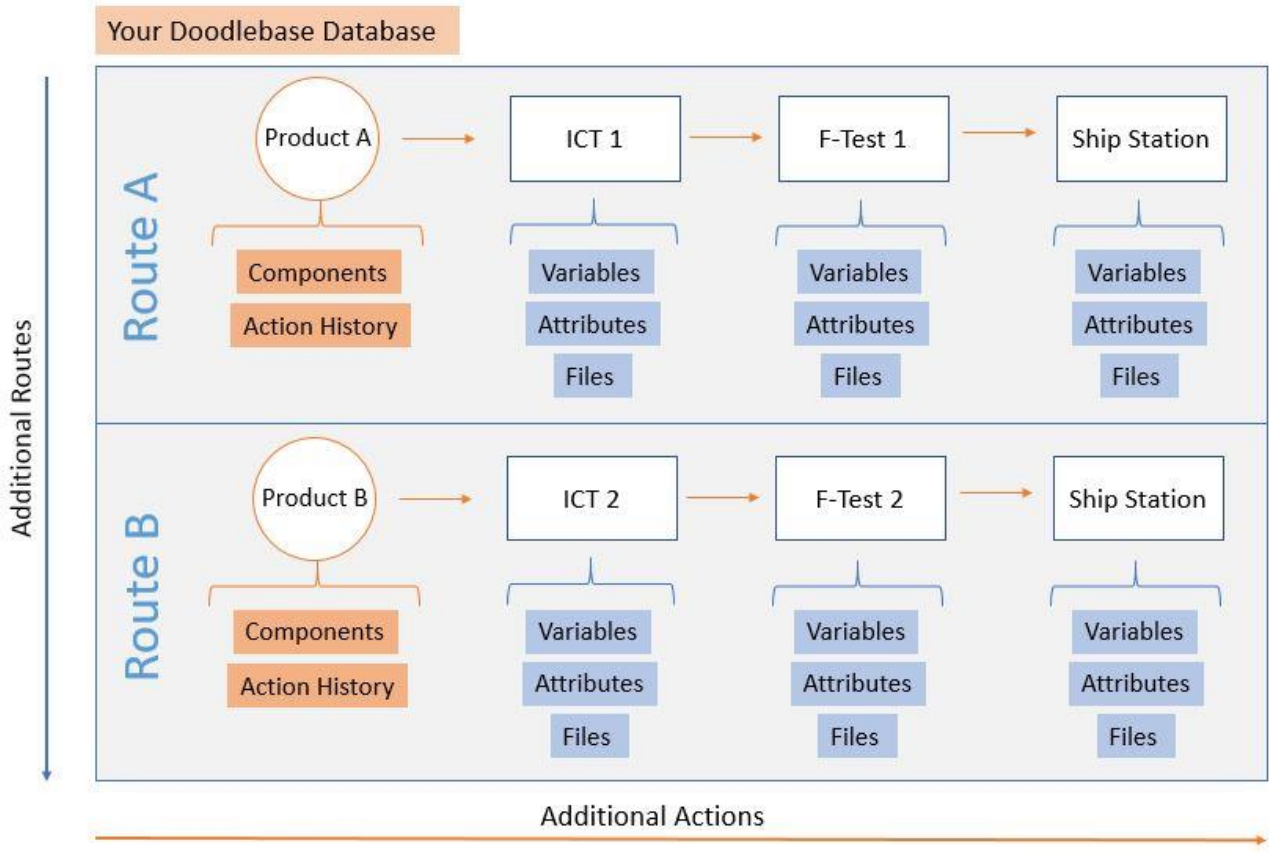
Attribute		
Name	Description	Required?
Name	Name of the attribute	Yes
Category	(optional) category of attribute	No
Creation Date	Date/Time of capture	Yes
Value	Value of attribute	Yes
Status	Pass/Fail status of the attribute	No

Files

Files are special in that there is no requirement to how they should be structured. You simply attach files to your actions (such as a photo of the product as it went through an action) and you can call upon these files to further explore root cause and diagnostic information with your process.

Putting it all together

Ultimately, you'll get a multi-dimensional schema built for manufacturing that allows you to easily understand what's happening with your manufacturing process by viewing the information you are interested in. After putting together your process, your product/action schema could look something like this:



Next Steps

Now that you understand the basics of the Doodlebase Schema and the Doodlebase Route Designer, it's time to learn how to collect and send your data to Doodlebase using either Labview or Visual C#. To learn how this process is achieved, open the "Transformer Guide," included in your Document Package.