



## PowerStages Product Specification

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## Introduction

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PowerStages is a vertical solution for Dynamics 365 Customer Engagement (Legacy Name: Microsoft CRM) to implement operational rules and conditions to custom entities.

User can define submit, approve, reject operations per user or team with notifications and displaying fields through PowerStages. The solution sends document over given flows for verification or processing.

Stages can be built up only through Status Reason (StatusCode) of the custom entity so in order to send the document from Stage A to Stage B, Stage A and Stage B must be defined in Status Reason (StatusCode) of selected entity.



*A User which has System Administrator Role at the tenant must import the PowerStages solution*

# Terminology

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## Staged Entity

It describes custom entity which is being extended with PowerStages.

## Condition

It defines rules and actors to be applied for.

## Rule

It is atomic operation and describes all implementations to be considered by PowerStages.

There are 3 types of rules;

- **Display Rule** manages field appearance in the form.

Field can be defined as

- **Read-only** makes the field not-editable
- **Mandatory** makes the field compulsory to fill so Dynamics CRM does not allow to save the record until field has data
- **Invisible** sets visibility of the field in the form

Any fields in the custom entity do not have Display Rule, PowerStages is going to apply default appearance to the field which are defined in Dynamics 365 out of box Entity Form section.

- **Flow Rule** defines “from” and “to” direction to the form through Status Reason (StateCode) of the custom entity. PowerStages puts visualization to the form during travel among stages.

- **Button Rule** holds operations to implement to the form.

There are 3 type of operations;

- **Submit** sends to form to the next stage
- **Reject** sends back the form to the sender
- **Approve** closes the form

Rule is valid for the actor who is defined under Condition except Flow Rule. It is valid for Staged Entity Level and no need to bind certain actor in condition. Document travels among stages via Flow Rules, but It can only be triggered by Button rule under Condition so Flow rule is indirectly bound to actor.

## Actor

Actor defines users or teams to whom will be responsible for the given rules.

## Record Status

It is out of box field of the custom entity and used for stage by PowerStages. Forms can travel among items in the status of record. It is called Status Reason (StatusCode) by Microsoft.

## Design

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PowerStages generates plugins, workflows, actions, ribbon buttons and client scripts in order to convert custom entities into forms such as application, subscription, dispute, incident etc.

PowerStages currently support

- Dynamics 365 CE On-premise version 9.0.2.
- Dynamics 365 CE Online 2020 version 9.1 release wave 1

Managed solution package is delivered to the client thus It is not allowed to make changes to any items in the solution package and also not allowed to manipulate records of the entities in managed solution delivery package.

## Solution Package

72 items come with the solution under following group;

- Entity (Custom Entities with Team and User out of box CRM Entities)
- Plug-in Assembly
- Process
- Sdk Message Processing Step
- Web Resource
- Custom Controls (for only Dynamics 365 CE Online)

## High Level Design

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PowerStages defines lifecycle of the forms after custom entities transformation complete. Converted custom entity will have submission, rejection or approval processes to be run against rule or conditions.

User has to mark any custom entities to convert into forms which will be used by PowerStages. In order to do this, A record has to be created in “StagedEntity” that comes within managed solution package, only after that rules or conditions can be created for the custom entity.

Solution manipulates Dynamics CRM Ribbon to add or remove button based on Button Rules so It is highly recommended to back up entity before converting it to the form. Apart, PowerStages already create business process flow to implement Flow Rules so Custom Entities which are going to be registered to the PowerStages, should not have any business process rules.

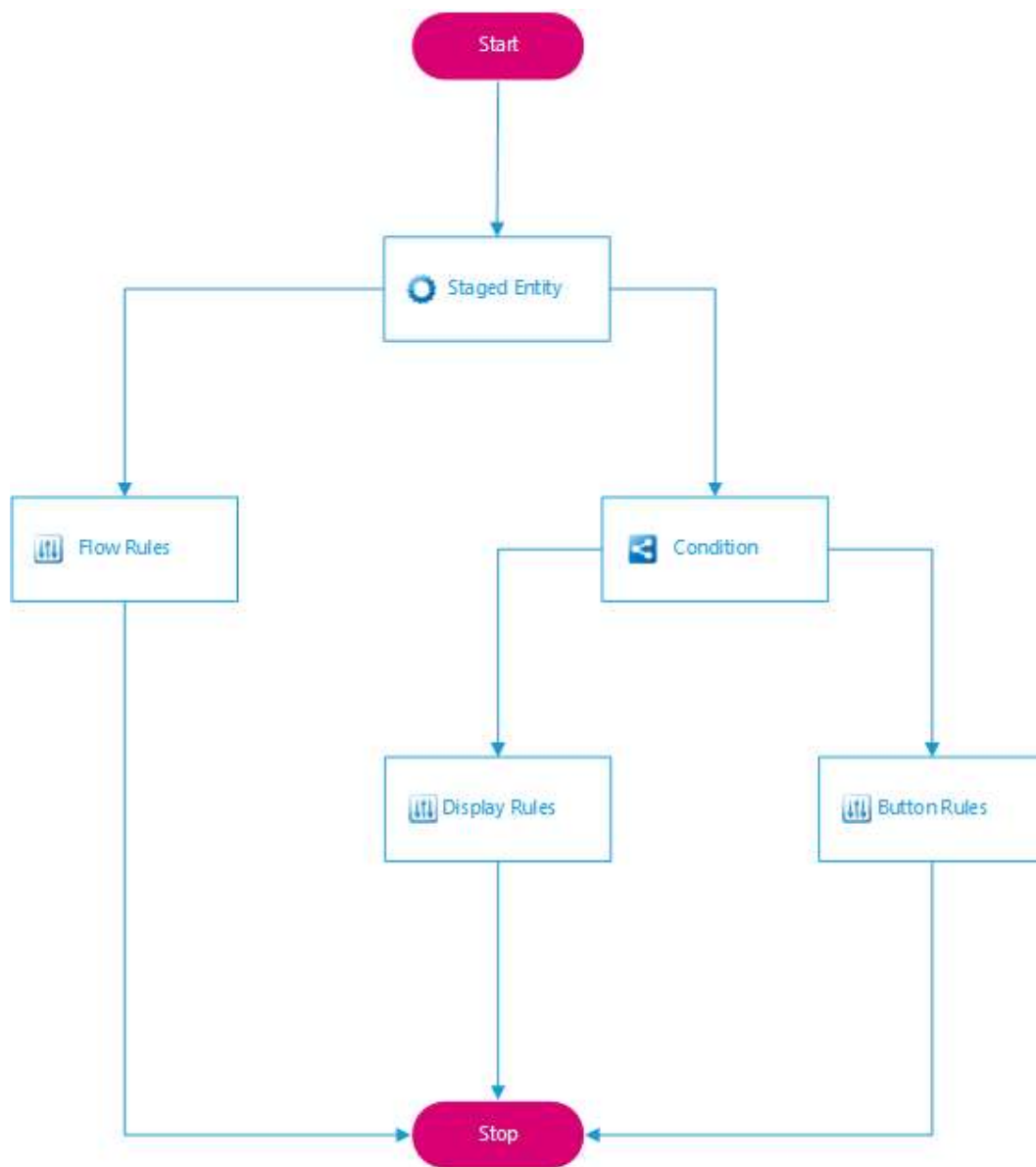


Figure 1- Process Flows

## Entities

PowerStages implements all configurations regarding forms through following entities;

### Staged Entity (*bnb\_stagedentity*)

Staged Entity marks a custom entity to be acted as a form and make it ready to be used by PowerStages.

**i** Operation is irreversible thus; you cannot remove the custom entity out from Staged Entity.  
Form of the custom entities must contain State Code (StateCode) and Status Reason (StatusCode) fields so Please add them to the custom entity before operation.  
Tip: You can consider adding those fields to Header or Footer of the form.

**i** Business Process Flow must be set for the custom entity which will be used by PowerStages.  
It can be done from Customizations section under Main Menu > Settings. Open the custom entity from customizations section then mark checkbox of Business process flows (fields will be created) field and save the custom entity.  
Note: You cannot unmark it once you save it.

**i** Business Process Flows that are created by PowerStages, can be found under PowerStages-ProcessFlows solution.  
Custom entity must have one form so do not create multiple forms through out of box entity form design section of Dynamics 365

STAGED ENTITY: INFORMATION  
Online Order Form

**General**

Display Name \* Online Order Form  
Logical Name \* bnb\_onlineorderform  
Entity Type Code \* 10082  
Business Process Flow Id \* ce046c2f-c5c2-ea11-9674-000e3a95ad7f  
Control Class Id 5d773807-9fb2-43db-97c3-7a91e8ba0ff  
Created On 7/10/2020 4:51 PM

**Flow Rules**

Name	Created On
Stage Flow Rule-1- From Order Creation (Sel...	7/15/2020 12:45 ...
Stage Flow Rule-2- From Manager Review To ...	8/3/2020 7:59 PM
Stage Flow Rule-3- From Sales Accountant To ...	8/3/2020 7:58 PM
Stage Flow Rule-4- From Finance Manage...	8/3/2020 7:59 PM

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**Conditions**

Name	Entity	Actor Type	Team	User	Created On
Accountant Team-Online Order Form	Online Order Form	Team	Accountant Team		7/11/2020 11:56 ...
Delivery Team-Online Order Form	Online Order Form	Team	Delivery Team		7/11/2020 11:56 ...
Finance Management Team-Online Order For...	Online Order Form	Team	Finance Management Team		7/11/2020 11:56 ...
Managers Team-Online Order Form	Online Order Form	Team	Managers Team		7/11/2020 11:55 ...

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**Lock Status**

Locked By Stage Flow Rule No  
Locked Object Id

Active

Figure 2- Staged Entity Main Form View

**Display Name:** Name of the custom entity. It is mandatory so user must type valid custom entity.

**i** PowerStages suggests best matching entities from the organization once user starts typing.  
If user clicks space, PowerStages will display all entities in the organization.

**Logical Name:** Metadata name of the selected entity. Field is mandatory, read-only and automatically set by PowerStages.

**Entity Type Code:** Reference code of the entity. The field is mandatory, read-only and automatically set by PowerStages.

**Business Process Flow Id:** Once user save the record, PowerStages creates business process flow for the selected entity and manage it once new Flow Rule is added or removed.

**Control Class Id:** Field is for internal usage. It is mandatory but editable so If the control class id of the datetime is different than auto-populated unique key (Guid), It is allowed to modify the value. Leave default if you are not sure.

**Flow Rules:** It lists all related rules regarding the custom entity. You can create new one through + sign in the right top of DataGrid header.

**Conditions:** It lists all related conditions regarding the custom entity. You can create new one through + sign in the right top of DataGrid header.

**Lock Status:** Adding flow rule is an asynchronous operation since business process flow is going to be modified so PowerStages do not allow bulk flow rule creation, it must be done one by one.

User should consider “Locked By Stage Flow Rule” to “No” before flow rule creation otherwise, PowerStages terminates the operation. “Locked Object Id” is a unique key (Guid) of the Rule(bnb\_rule) entity.



## Condition (bnb\_condition)

Condition defines actor to whom rules to be implemented.

The screenshot shows the 'CONDITION : INFORMATION' form for 'Sales Team-Online Order Form'. The form includes the following sections:

- Name:** Sales Team-Online Order Form
- Entity:** Online Order Form
- Actor:**
  - Actor Type:** Team
  - Team:** Sales Team
  - User:** (empty field)
- Rule Script:**

```
const [SortOnSalesTeamTeam_1] = [{"Invisible": ["Controls":["Name"],["bnb_deliverydate"],["bnb_productqualitycontroldate"]], "ReadOnly": ["Controls":["Name"]], "Required": ["Controls":["Name"],["bnb_orderdate"],["bnb_productname"],["bnb_quantity"],["bnb_productcolor"],["bnb_vatamount"]]}];
```
- Rules:** A table listing rules with columns 'Name' and 'Created On'.

Name	Created On
Button Rule-Order Creation (Sales Team)-Submit	7/11/2020 1:43 P...
Display Rule-Order Creation (Sales Team)-Delivery Date-Invisible	7/15/2020 8:43 P...
Display Rule-Order Creation (Sales Team)-Order Date-Mandatory	7/15/2020 1:57 P...
Display Rule-Order Creation (Sales Team)-Product Color-Mandatory	7/15/2020 8:23 P...
Display Rule-Order Creation (Sales Team)-Product Name-Mandatory	7/15/2020 2:02 P...
- Lock Status:**
  - Locked By Button Rule:** No
  - Locked Object Id:** (empty field)

The form is in 'Active' state.

Figure 3- Condition Main Form View

**Name:** Name of the record. Field is mandatory, read-only and automatically set by PowerStages.

**Entity:** Reference to the Staged Entity to display which custom entity is going to be used for the condition. Field is mandatory, read-only and automatically set by PowerStages.



User Role or Members Role of the Team must have necessary privilege on read for Condition (bnb\_condition) Rule (bnb\_rule), Decision (bnb decision), Distribution List (bnb\_distributionlist) entities. Please contact CRM Administrator to ensure if Roles or Users have necessary rights, Otherwise, PowerStages does not work expected.

**Actor Type:** To whom rules are going to be applied. Field is mandatory so user must select either "Team" or "User".

**User:** When Crm user selects "Actor Type" as "User", Field gets visible and mandatory. Crm user must select a record from the list.

**Team:** When Crm user selects "Actor Type" as "Team", Field gets visible and mandatory. Crm user must select a record from the list.

**Rule Script:** Field is for internal purpose so no need to touch

**Rules:** List all rules underneath.

**Lock Status:** Adding button rule is an asynchronous operation since Ribbon menu is going to be modified so PowerStages do not allow bulk display rule creation, it must be done one by one. User should consider “Locked By Button Rule” to “No” before button rule creation otherwise, PowerStages terminates the operation. “Locked Object Id” is a unique key (Guid) of the Rule(bnb\_rule) entity.

## Rule (bnb\_rule)

Rule defines orders to be implemented by PowerStages for the custom entity as a form to the actor under condition based on Record Status.

There are 3 type of rule that can be created;

### Display Rule

It defines field or relation dependencies for actor and record status. If the form does not meet the display rule, PowerStages will not allow form operations such as submit, reject or approve.

Figure 4- General Section of Display Rule

**Name:** Name of the record. Field is mandatory, read-only and automatically set by PowerStages.

**Condition:** Rule must be bound to a condition so Display rule will apply to certain actor. Field is mandatory, read-only and automatically set by PowerStages.

**Type:** Rule type. User must choose “Display Rule” from the list. Field is mandatory, read-only if the form is update or editable for new record.

**Record Status:** Status of the custom entity. Field is optional. However, User must fill it with a value in order to see result of the rule in the form.



PowerStages suggests best matching status from the organization once user starts typing.

If user clicks space, PowerStages will list all values from Status Reason of the Custom Entity.

**Record Status Item Id:** Reference to the Status Reason of the Custom Entity. It is used for internal purpose. Field is mandatory, read-only and automatically set by PowerStages.

You can define 2 types of display rule;

## Field

Appearance in the form.

The screenshot shows a 'Display Rule' configuration form. It has three main sections: 1. 'Display Rule Type' set to 'Field'. 2. 'Field' set to 'Order Date'. 3. 'Display Rule' set to 'Mandatory'. Below these, there is a 'Schema Name' field containing 'bmb\_orderdate'.

* Display Rule	
* Display Rule Type	Field
* Field	Order Date
* Display Rule	Mandatory
Schema Name	bmb_orderdate

Figure 5- Field Type Display Rule Main Form

**Display Rule Type:** Choose type of the display rule as “Field”

**Field:** Choose the field from the custom entity which is defined under Condition



PowerStages suggests best matching fields from the organization once user starts typing.

If user clicks space, PowerStages will list all fields in the Custom Entity.

**Display Rule:** Choose field appearance form the list.

You can configure field in the form as

- Mandatory: Actor cannot leave the field empty to send, reject or approve forms for current record status.
- Read-Only: Actor cannot change the field value for current record status
- Invisible: Actor cannot see the field for current record status.

**Schema Name:** Unique name of the field that is selected above. It is used for internal purpose.

Field is mandatory, read-only and automatically set by PowerStages

## Relationship

Related entities dependencies.

Display Rule

*Display Rule Type	Relationship
--------------------	--------------

*Display Rule Relationship Type	1 to N
*Display Rule Relationship Name	bnb_onlineorderform.bnb_onlineorderform > bnb_basket.bnb_orderformid
*Display Rule Relationship Minimum Record	2

Schema Name	bnb_onlineorderform_bnb_basket
-------------	--------------------------------

Figure 6- Relationship Type Display Rule Main Form

**Display Rule Type:** Choose type of the display rule as “Relationship”

**Display Rule Relationship Type:** Choose relationship type that will be set mandatory by PowerStages. You can choose one of the following items;

- 1-N Relationship: Actor cannot send, reject or approve forms under current record status unless child record(s) exists.
- N-1 Relationship: Actor cannot send, reject or approve forms under current record status unless record(s) binds to a parent.
- N-N Relationship: Actor cannot send, reject or approve forms under current record status unless regarding record(s) exists.

**Display Rule Relationship Type:** type relationship name in order to choose the relationship from list



PowerStages suggests best matching fields from the organization once user starts typing.

If user clicks space, PowerStages will list all relationships in the Custom Entity.

**Display Rule Relationship Minimum Record:** configure count of the related records which will be used by PowerStages for form validation. It is numeric and mandatory.

Main record must have at least count of given number related records.

**Schema Name:** Unique name of the field name of relationship that is selected above. It is used for internal purpose. Field is mandatory, read-only and automatically set by PowerStages.

## Stage Flow Rule

It defines path for the custom entity to follow. It is directly bound to Staged Entity so flow is valid for all record status.



Record Status is key for the stage, there is lonely connection between Record Status and Actor through rules under conditions.

So, if a user or user's team matches at least one condition with current status of the custom entity record under the rules, User will be able to open the record successfully otherwise, PowerStages prevents opening the form.

Condition (with Actor) -> Rules (Record Status) = User rights over the record

RULE : INFORMATION

Stage Flow Rule-1- From Order Creation (Sales Team) To ...

**General**

Name \* Stage Flow Rule-1- From Order Creation (Sales Team) To Manager Review

Entity \* Online Order Form

Type \* Stage Flow Rule

**Stage Flow Rule**

Order 1

\*From Order Creation (Sales Team) \*To Manager Review

Record Status Stage Flow From Item Id 1 Record Status Stage Flow To Item Id 960400000

**Distribution List**

Name ^	Default Email Address	Default Queue	Created On
Managers Team-Previous Stage			7/21/2020 4:26 P...
Muhammet Atalay Anonymous-Next Stage	muhammet.atalay@crm.com		7/21/2020 4:32 ...
Sales Team-Next Stage		Online Order Queue for Sales Team	7/21/2020 4:11 ...

Figure 7- Stage Flow Rule Main Form

**Name:** Name of the record. Field is mandatory, read-only and automatically set by PowerStages.

**Entity:** Reference to the Staged Entity to host stages. Field is mandatory, read-only and automatically set by PowerStages.

**Type:** Type of the rule. Field is mandatory, read-only and automatically set by PowerStages with "Stage Flow Rule".

**Order:** Sequence number. Stages will be ordered through number. Field is mandatory, read-only and automatically set by PowerStages.

**From:** Form direction, describes starting. Field is mandatory and must be set by user.



*PowerStages suggests best matching record status from the custom entity once user starts typing.*

*If user clicks space, PowerStages will list all status items in the Custom Entity.*

**To:** Form direction, describes target. Field is mandatory and must be set by user.



*PowerStages suggests best matching record status from the custom entity once user starts typing.*

*If user clicks space, PowerStages will list all status items in the Custom Entity.*

**Record Status Stage Flow From Item Id:** Reference to the Status Reason of the Custom Entity. It is used for internal purpose. Field is mandatory, read-only and automatically set by PowerStages.

**Record Status Stage Flow To Item Id:** Reference to the Status Reason of the Custom Entity. It is used for internal purpose. Field is mandatory, read-only and automatically set by PowerStages.

**Distribution List:** *Display all items in the Distribution List.*

## Button Rule

It defines button to be displayed for actor under certain status thus it is bound to a condition.



PowerStages is going to add Item to the Ribbon so Ribbon XML will be changed and published against organization. It is recommended to back up solution of the selected custom entity.

As PowerStages publishes a button to the Ribbon, CRM Engine locks the entity during publish operation for a while. Performance degradation might occur for only selected custom entity at that time.



Power Stages collect all custom entities which are marked as a "Form" and has at least one button rule, under a solution that is called: PowerStages-RibbonButtons.

**RULE : INFORMATION**

### Button Rule-Order Creation (Sales Team)-Submit

**General**

Name *	Button Rule-Order Creation (Sales Team)-Submit
Condition *	Sales Team-Online Order Form
Type *	Button Rule

\*Record Status Order Creation (Sales Team)

Record Status Item Id 1

**Button Rule**

*Button Type	Submit
--------------	--------

Figure 8- Button Rule Main Form

**Name:** Name of the record. Field is mandatory, read-only and automatically set by PowerStages.

**Condition:** Reference to a condition to add actor. Field is mandatory, read-only and automatically set by PowerStages.

**Record Status:** Status of the custom entity. Field is optional. However, User must fill it with a value in order to see result of the rule in the form.



PowerStages suggests best matching status from the organization once user starts typing.

If user clicks space, PowerStages will list all values from Status Reason of the Custom Entity.

**Record Status Item Id:** Reference to the Status Reason of the Custom Entity. It is used for internal purpose. Field is mandatory, read-only and automatically set by PowerStages.

**Button Type:** Type of button. It can be one of the following;

- Submit
- Reject
- Approve

### Decision (bnb\_decision)

Entity keeps details of the operation as a log. It is accessible from Advanced Find.



No action requires from user since it is created by only PowerStages when user submits, approves or rejects a form.

Figure 9- Decision Main Form

**Name:** Name of the record. Field is mandatory.

**Operation Type:** states the operation: submit, reject, approve.

**Regarding Name:** Name of the form which is used for the operation.



**Regarding Entity Type:** Logical Name of the form which is used for the operation.

**Regarding Id:** Unique Identifier of the form which is used for the operation.

**From:** Sender (status = stage).

**Record Status From Item Id:** Unique Identifier of the sender status.

**To:** Receiver (status = stage).

**Record Status To Item Id:** Unique Identifier of the receiver status.

**By:** User who operates.

**On:** Operation Date and Time.

### ***Distribution List (bnb\_distributionlist)***

It defines notification once any operation occurs. It is bound to Stage Flow Rule. Thus, when a record reaches the given stage or sends from the stage, PowerStages apply notification to the Distribution List members. It can be Email Activity or An Item in the Queue.

The screenshot displays the 'DISTRIBUTION LIST : INFORMATION' form for 'Sales Team-Next Stage'. The 'General' tab is active, showing fields for Name, Rule, Message Direction, Actor Type, Team, User, Anonymous Recipient Name, and Owner. The 'Notification - Email' tab shows fields for Email, Default Email Address, Subject, and Description. The 'Notification - Queue' tab shows fields for Queue Item, Default Queue, and Default Queue Id.

DISTRIBUTION LIST : INFORMATION			
Sales Team-Next Stage			
<b>General</b>			
Name	Sales Team-Next Stage		
Rule	Stage Flow Rule-1- From Order Creation (Sales Team) To Manager Review		
Message Direction	Next Stage		
Actor Type	Team		
Team	Sales Team		
User			
Anonymous Recipient Name			
Owner	First name Last name		
<b>Notification - Email</b>			
Email	Yes		
Default Email Address		Subject	test
Description	test description		
<b>Notification - Queue</b>			
Queue Item	Yes		
Default Queue	Online Order Queue for Sales Team	Default Queue Id	ddf2a759-b8c9-ea11-9677-000d3a98ad7f

Figure 10- Distribution List Main Form

**Name:** Name of the record. Field is optional, read-only and automatically set by PowerStages.

**Rule:** Reference to a Stage Flow Rule. Field is mandatory, read-only and automatically set by PowerStages.

**Message Direction:** Each stage has 3 possible actions,

- From may be sent to next stage (submit)
- Form may be sent back to previous stage (reject)
- Form may be closed (approve)

So, User can define specific distribution lists for 3 actions.

User can select one of the following;

- Next Stage
- Previous Stage
- Closure

**Actor Type:** To whom rules are going to be applied. Field is mandatory so user must select either "Team", "User" or Anonymous.

**User:** When Crm user selects "Actor Type" as "User", Field gets enable and mandatory. Crm user must select a record from the list.

**Team:** When Crm user selects "Actor Type" as "Team", Field gets enable and mandatory. Crm user must select a record from the list.

**Anonymous:** When Crm user selects "Actor Type" as "Anonymous Recipient Name", Field gets enable and mandatory. Crm user must type free text with the name of party.

Since Field keeps out of CRM recipients, PowerStages does not allow to configure Queue.

**Owner:** CRM User who owns the record.

**Email:** If Crm users want to set Email notification for the given Stage Flow Rule with defined direction, it must be selected as "True"

**Default Email Address:** It is optional. User can set up an email address regardless actor type (except Anonymous) for target. If user does not text any value, PowerStages will fetch email address of actor from CRM Organization.



*If Actor Type is Team and Crm User leaves Default Email Address blank, PowerStages will create email activity for member of Team.*

*If Actor Type is Anonymous, Default Email Address gets mandatory.*

**Subject:** User can type custom subject for the email. If it is empty, PowerStages will use default text which is "New form has been arrived".

**Description:** User can type custom description. If it is empty, PowerStages will use default text which is "You have been sent a form, please have a look at CRM for further details"

**Queue Item:** If Crm users want to see form in the target queue as an item, it must be selected as “True”

**Default Queue:** It is optional. But User must set a queue if the Queue Item is True, otherwise Queue Notification will not work for the given actor.



*PowerStages suggests best matching queue from the organization based on actor once user starts typing.*

*If user clicks space, PowerStages will list all available values of the actor.*

**Default Queue Id:** Reference to the selected queue. It is used for internal purpose. Field is read-only and automatically set by PowerStages.