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Pally Software Tutorial

This Tutorial is based on Pally version 2.4.2.1. Other versions may have different steps or different looking screens.

Pally is compatible with all UR models, 3-16. The UR controller must be running a minimum version of Polyscope as summarized below:

CB-series: Polyscope version 3.8 or higher.

E-series: Polyscope version 5.2 or higher.

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Pally - cloud based software start up and configuration

Step 1 – This tutorial is for configuring Pally and the UR controller to work with the Palletron 3000 hardware. It assumes the Pally and Ewellix UR caps are already installed. If not, see the following links for <u>Pally</u> and <u>Ewellix</u> installation instructions.

Step 2 – Open the <u>Pally software</u> – it should bring you to the Project Data Tab, if not navigate to that tab as shown below.

	Project	
>	Name: New_project	
>	Name your project Description:	
>	Will be shown when choosing a pattern on the robot	
>		
	> > > >	Project Name: New_project Name your project Description: Vill be shown when choosing a pattern on the robot

Step 3 – Give the project a unique name, for this tutorial it's called "TestPallet1". Enter a description if desired.



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Step 4 – Go to the Product Tab or press next

Step 5 – Measure the box being palletized and enter the dimensions in the corresponding length, width, and height field. Make note of the orientation of the dimensions as it sits on the conveyor. It's critical that the dimensions match this orientation as the product is coming down the conveyor. Note: the dimensions are in millimeters

Step 6 – Weigh the box and enter the weight in the corresponding field. NOTE: the weight is in grams.

Step 7 - OPTIONAL: If the label orientation is of interest, move the Label Orientation slider and select the location of the label from the drop down.

<u>57117</u>	Project data		Product	
:=	Project	>	Length: 290 mi	
۲	Product	>	Width: 190 mi	
	Pallet	>		Width Length
	Palletizing	>	Height: 200 mi	
			Weight: 2500	Product dimensions
			Label orientation	
			Label orientation: Back Which side of product is the label added? Front = end of conveyor	
				Label orientation
v2.0.2				NEXT >

Step 9 – If the pallet being used is a standard pallet, select it from the drop down. This will populate the length and width dimensions. If the pallet is non-standard or doesn't show in the dropdown, fill in the length and width manually. NOTE: these dimensions are in millimeters.

Step 10 – Select the number of layers being palletized, this is the number of boxes in the vertical direction.

Step 11 – Fill in the full pallet height or the number of boxes in the vertical direction (layers). If entering the height, this is only the height of the boxes and does not include the height of the pallet off the floor. If the number of layers is filled in, the full height will automatically be populated. If the full height is entered, then the number of layers is automatically populated.

NOTE: the full height dimension is in millimeters

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Step 12 – OPTIONAL: if the boxes are going to overhang the edges of the pallet, select the pallet overhang slider. Enter the overhand amount on the sides and ends as shown in the picture. The software will not detect if the overhand value entered will cause the box to fall. For example, if the length of the box is 200 mm and the overhand value in this direction is entered as 150 mm, the box will fall off the pallet. Make sure the value entered makes the box stable when palletized.

NOTE: These dimensions are in millim	neters.
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<u>۲۵.۲۲۲</u>	Project data		Pallet			
:=	Project	>	Standard pallet: US 1: 1219 x 1016		•	11m
۲	Product	>	Length: 1219	raro paner	mm	
	Pallet	>	1213			Pallet dimensions
	Palletizing	>	Width: 1016		mm	
			Layers: 5	Full height 1000	mm	
			Total no. of layers	Pallet load height when finished	1	
			Overhang ends: 10		mm	
			Allowed product overhane Overhang sides:	g top and bottom		
			Allowed product overham	g left and right		
v2.0.2						NEXT >



Step 13 - Select the Palletizing tab or press next

Step 14 – Select the maximum number of boxes to be gripped at once – for this example it is 1.

Step 15 – Enter the value for box padding. Box padding is the amount of space to be left between boxes. It's recommended to leave a little space, so for this example we will leave 1 mm. This value can be increased if needed or desired.

NOTE: This dimension is in millimeters.

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Step 16 – OPTIONAL: Select whether or not there are shim papers between layers. If there are, enter the height of the paper in mm. For this tutorial there is no shim paper.

NOTE: This dimension is in millimeters.

20117	Project data	Palletizing	
:=	Project >	Max grie: 1 The max cumber of products that can be lifed at porce	
\$	Product >	Box pading: 1 mm	
	Pallet >	Free space between products Box padding Shim nanor hetween layers	
	Palletizing >	Jillin paper verween rayers	
v2.0.2			NEXT >



Step 18 – This will bring up the pallet stacking method and provide a visualization of what the pallet stack looks like. On the left will be the different options for stacking methods. If using a simple stacking method, select a preconfigured method.

Column Stack – all of the boxes are right on top of one another in the vertical (column) direction.

Rotate - each layer is rotated 180 degrees from the previous layer

Mirror Vertically – every other layer is mirrored on the width side of the pallet.

Mirror Horizontally - every other layer is mirrored on the length side of the pallet.

Customized – edit each layer individually (skip to step 19a)

Except for the custom option, each stacking method will present base pattern options that will work with the given box dimensions. For each different stacking method and base pattern combinations, the software will show the pallet summary which includes the number of boxes, the pallet height (this includes the height of the pallet itself, the load height (height of just the boxes), total pallet weight, the number of layers in the vertical direction, the layer efficiency (ratio of boxes to empty space), and the cube efficiency (ratio of the boxes to empty space for the entire stack).



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Step 19 – Once a preconfigured method and base pattern is selected, click on the reorder sub tab, shown

Step 20 – On this tab each layer can be moved (drag and drop), layers can be added (+ sign), or individual layer configurations and patterns can be edited. Modify each layer if needed.

Step 21 – Once the pallet has been configured and customized as needed, press Download Palletizing File.

This will download the JSON file the directory the web browser stores downloaded files. The file will have the naming convention projectName.json. In this case it is TestPallet1.json.

Step 22 – Retrieve this file and save it to a USB flash drive. The flash drive needs to be configured such that the main directory has the .json file and the "urmagic_upload_pattern.sh" file. Do not put either of these files into a folder. Once this USB stick is plugged into the UR controller, the files will be created and stored in a folder named "patterns on the controller.

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Using the Pally output on the Palletron3000

This section of the tutorial begins the instructions for palletizing on the UR controller. It will require a calibration box of known length, width, height, and weight.

Step 23 – On the UR pendant, start a new, empty program.

Step 24 - Select Program Frogram in the upper left.

Step 25 - On the left-hand side, expand UR Caps and select Pally

Step 26 – Make sure the command and overview tabs are selected, and the screen should look like this.

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Step 28 – Enter the Length and Width as viewed from the top and the height as viewed from the side.

Step 29 - Now the location of the box on the primary conveyor will be configured. First, select set

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Step 30 - Either use free drive or the manual controls to position the arm and gripper. Once the robot is in

position, press ok

to save the location.

Step 31 – Next, enter the total width of the conveyor. This is the width of the conveyor outside to outside, including the supports, not just the part that moves.

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Step 32 – Select if the fixed guide is on the left or right side of the conveyor.

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> Basic ^	۹	Command	Graphics	Variables	;		
> Advanced > Templates	1 ▼ Robot Program 2 ♥ ▼ Pally	Pally					
✔ URCaps	3 • ▼ beforePallet	Overview	Pickup	Pallet	Movement	Advanced	
Collision Detection	• • • • • • • • • • • • • • • • •	Calibration E	Box Prim	ary Se	condary	Advanced	_
Apply Contact O	7 ♥ ▼ beforeGrab 8 ↓ ♥ TODO: add your own comman	? Fb	ed Guide Pos	ition ?	Fixe	ed Guide Width	
Find Conta Offset	9 ♥ ▼ afterGrab	11.8					
Find Surfa	10	PN					
Finishing Tool Contr	12 TODO: add your own comman	' H	7			-	
Force Ever	14 TODO: add your own comman						
Force Control	15 ♥ ▼ afterZone 16 ▶ 'TODO: add your own comman		بالطا				
Insertion	17 • • • onSheet			_			
Path Generator	19 ♥ ▼ afterPallet	Loft					
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Path ✓ ✓	▲ ➡ つ ♂ ¥ ॿ ॿ ॼ	Back				N	ext
Normal	Speed	100%	D	00)	Simulation	

Step 33 – Measure and enter the distance from the outside of the conveyor to the edge of the box when it hits the guide.

NOTE: These dimensions are in millimeters.

Step 34 – Press next

Step 35 – If using a secondary conveyor, repeat steps 29-34 for the second conveyor. Otherwise click next

Next

. Now the location of the left and right pallets will be calibrated.

Step 36 – Use the diagram on the screen and teach the three locations shown using the set point button and the UR controls (same as step 30) for each location. Note that with the Palletron 3000, the side with two boxes is the side closest to the robot.

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- Step 37 Once the left pallet is configured, press next
- Step 38 Repeat step 36 for the right pallet.
- Step 39 Once done, press next

Run	Program					PRO INSTALL	GRAM <unnamed< b="">: ATION default</unnamed<>	>* [] New	Open	Save	R+	
> Ва	asic	^				م	Command	Graph	nics	Variable	es	
> Ас > Те	dvanced emplates		1 2	▼ Robot 9 ▼ Pally	Program		Pally					
V UP	RCaps		3 4	የ ▼ be	forePallet 'TODO: add	your own commar	Overview	Pick	up	Pallet	Movement	Advanced
	Collisior Detecti	on	5 6	9 ▼ be	e <mark>foreZone</mark> 'TODO: add	your own commar	Left Palle	t Rig	ht Palle	t		
	Apply Contact	t O'	7 8	¶ ▼ be	f oreGrab 'TODO: add	vour own commar	••	Move h	here	17		🗹 Enable
	Find Co Offset	nta	9 10	የ ▼ af	terGrab 'TODO: add	vour own commar		Channa				
	Find Su Finishin	rfa g	11 12	∳ V be	foreRelease	vour own commar	Ð	Change	point			
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<	Path	>		₹5	~ X		Back					NEXL
0	Normal					Speed	100	%	D	0 (Simulation

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Step 40 – This will bring up the movement tab. The first sub tab is speed, this where the acceleration and speeds can be set for general movements and approach speeds. These can be changed later, so if unsure,

Step 41 – Now, the waypoints for each box movement will be set. First enter the box free height. This is how far the box must be moved vertical before it is free of the conveyor and guide rails.

NOTE: These dimensions are in mm.

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Step 42 – Next, enter the approach distance offset. This is how far from the already palletized boxes the new box will move to before moving into its final location. The default value of 30mm is a good starting point and can be tweaked as needed.

NOTE: These dimensions are in mm.

asic 🔨			Q	Command	Graphics	Variables	5	
dvanced emplates	1 2	▼ Robot Progr ♥ ▼ Pally	am	Pally				
RCaps	3	P ▼ beforePa	allet): add your own comma	o Overview	Pickup	Pallet	Movement	Advanced
Collision Detection	5	 P-▼ beforeZ P-TODO 	one D: add your own comma	n Speed	Waypoints	Waiting	Position	
Apply Contact O	7 8		rab): add your own comma	an ?	Approach Dis	tance ?)	Pallet Lip
Find Conta Offset	9	የ ▼ afterGra	d					
Find Surfa	10	- ● 'TODO): add your own comma eleace	n				
Finishing Tool Contr	12	● ▼ afterBeld): add your own comma	in 📃 🕅				
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Path >		₽> <i>⊂</i>	× 🖪 🖥 🖬 🔤	Back				Nex

Step 43 - Lastly is the pallet lip. This defines how tall the lip on the pallet is (there may not be one). Once

entered, press next

NOTE: These dimensions are in millimeters.

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Step 44 – This brings up the waiting position set point. This is the location the robot arm will go to and wait if there is no pallet present or if the pallets are full and have not been changed yet. Press set point and use the

Step 45 – This will bring up the advanced tab that has path planning and system settings. Do not change

any of these unless instructed to by Cross Technical Support. Press Next twice.

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		Finish
Step 46 -	Press finish	

The late

Step 47 – This should the program back to the screen similar to below (note: note the bullet points below the Pally logo may be different depending on what has already been configured). If the Palletron 3000 is new, the installation parameters should already be complete and the system is ready to palletize. Press play

to begin the program. If this system was reset or there are bullet points below the Pally logo, then go on to step 48..

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Configuring the Pally Installation for first time use

The hardware configuration is already configured for the Palletron3000. Only use these steps if the system was reset or something in the hardware configuration needs to be changed.

Step 48 – Next press the installation tab Installation in the upper left of the UR pendant. Make sure Pally under UR Caps is selected and the screen should look similar to below

Step 49 - Press Get started

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Step 50 - Make note of the gripping mount Important notice. This tutorial assumes the gripper is mounted

Step 51 - Choose the gripper from the dropdown. For the Palletron 3000, it is a customer gripper. Press

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Step 52 – Enter the dimensions and weight of the gripper. The dimensions for the standard vacuum gripper

Next

on the Pa	alletron 3000 are shown below. Press next when done.
Run Program Instalation	
🔪 General	Pally
> Safety	
> Features	
> Fieldbus	Overview Gripper Lifting Column Input/Output License Advanced
✔ URCaps	Mounting Type Dimensions Input/Output
Copilot	Length & Weight ? Height & Width ? Caution!
Pally	
LIFTKIT	Length: 240.0 mm Weight: 1.5 kg
Normal	Back Next Speed 100% C C Simulation

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Step 53 – Since using a custom gripper, the command for activating the gripper need to be manually programmed. As noted in the screen below, this is done in the callback nodes of the program.

To see these nodes, press the program tab in the upper left. The code to the turn on the gripper should be added in the before Grab section. The code to release the box or turn off the gripper should be added to the before Release section. This code should already be entered on the Palletron 3000.

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come install	ed. If the	e UR Cap i	s not install	led, go to s	tep 1. I	Press next	N	lext
Run Program Instalation		Log	PROGRAM <unr INSTALLATION defau</unr 	named>* 🔔 ult New Op	Den Save	R+		
💙 General	Pally							
🔪 Safety								
> Features							Ш	
💙 Fieldbus	Overview	Gripper	Lifting Column	Input/Output	License	Advanced		
✔ URCaps	Туре	Characteristics	Input/Output					
Copilot								
Pally				- L				
LIFTKIT			Choose Lifting Co	blumn:	T			
			Ewellix		▼			
			To use this lifting cc install the Liftkit v. 1	olumn, .0.6 URCap or higher	-			
	Back							Next
O Normal		Speed	(100%		D	Simu	lation

Step 56 - Enter the maximum stroke. On the Palletron 3000, it is 800mm. Press next

Next

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NOTE: this dimension is in millimeters.

			PROGRAM <un< b="">r INSTALLATION defau</un<>	named>* 🔒 i ult New o	Oper Save	R+	Local	
> General	Pally							
> Safety								
> Features							L	
> Fieldbus	Overvie	w Gripper	Lifting Column	Input/Output	License	Advanced		
✔ URCaps	Туре	Characteristics	Input/Output					
Copilot	Maxin	num Stroke ?						
Pally								
	80	(mm) 0.0 mm						
	Back							Next
Normal		Speed		100%			Simu	lation

Step 57 - The control of the column is done through the UR cap so no custom code is needed here. Press

next	xt						
		PROGRAM <unna< b=""> INSTALLATION default</unna<>	med>*	Open Save	R+	Local	
> General	Pally						
> Safety							
> Features						Ш	
> Fieldbus	Overview Gripper	Lifting Column	Input/Output	License	Advanced		
✔ URCaps	Type Characteristics	Input/Output					
Copilot	Note						
Pally							
LIFIKI	Controlling the inputs and outputs of the Ewellix lifting column will be handled natively by this URCap. The lifting column will be lifted by the height of the box for each layer.						
Normal	Back	•	100%)	Simula	Next

Step 58 – For the Palletron 3000, the base is custom. Make sure custom base is selected in the drop down

Next

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Step 59 - Configure the pallet sensors as shown in the image below. This is the setup for the Palletron

3000. Then	press next	Next						
Run Program Installation		PI INSTA	ROGRAM <unnamed>*</unnamed> ALLATION default*	New OF	en Save	<u>ارب</u>		
 > General > Safety > Features > Trans 	Pally							<u> 27'II'</u>
➢ Fieldbus✓ URCaps	Base Pallet	Conveyor	2nd Conveyor	LED-to	License	Advanced		
Pally LIFTKIT	Left Pallet Enable Start palletizing signal: digital_in[5] No pallet signal: -None-	? Inverse: Sta ⊠ dig No □ -\\k	Right Pallet	? verse:				
Normal	Back	Speed C	100%		200)	Simul	Next

Step 60 - The Palletron 3000 only uses one product sensor. Configure the screen as shown below and

press next	Next				
Run Program Installation		PROGRAM <unnamed>*</unnamed> INSTALLATION default*	New Open Save		
〉 General	Pally				
> Safety					
> Features					
> Fieldbus	Overview Gripper	Lifting Column Input	Output License	Advanced	
✔ URCaps	Base Pallet Con	veyor 2nd Conveyor	LED-tower		
Copilot	Sensors ?				
Pally	1st Product Sepsory Inverse	1st Product Sensor	2nd Product Sensor		
LIFTKI					
		7			
	2nd Product Sensor:				
	-Always-LOW- 🔻 🔲				
	Priority Sensor:	L	6 6		
	-Always-LOW-				
	Back				Next
Normal	Speed	 100%		Sit	mulation

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Step 61 - For this tutorial there is only one conveyor. If a second conveyor is used, then it would be

configured the same as step 60 except using this conveyors I/O. Press next

Step 62 – There is no LED tower on the Palletron 3000 so leave everything as it and press next

Next

		PF INSTA	ROGRAM <unnamed> ALLATION default*</unnamed>	· La P	an Save	R+	Local	8 8 E D	\equiv
🔪 General	Pally								
> Safety									
> Features									IJ
> Fieldbus	Overview Grip	ber Lifting	g Column Inpu	it/Output	License	Advanced			
✔ URCaps	Base Pallet	Conveyor	2nd Conveyor	LED-tow	ver				
Copilot Pally	Green Light		Yellow Ligh	nt		Red Light			
LIFTKIT	(()) 2 pallets are present The robot will continue with the next pallet when the current pallet is full.		((b)) 1 pallet is present The robot will stop when the current pallet is full.						
					Prog Emer norm				
	-None-	Inverse:	None- 🔻	Inverse:	-None-	▼ □	se:		
	Back							Nex	ct
Normal		Speed	100%	C)	Simu	lation 🔵	

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Step 63 – The license was installed on the UR controller prior to shipment and the details are shown here.

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Step 65 – Press the program tab in the upper left and the screen should be the same as shown below. If there are any bullet points below the Pally Logo, this indicates something wasn't configured correctly. Address any of these using the steps above. Otherwise, the system is ready to palletize. Press the Play

button to started the program.

This completes the tutorial. If anything is not working correctly, please contact Cross Technical support.

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Optional Steps for configuring a custom pallet pattern.

Edit this layer

edit this layer

Step 19c. – This will bring up a graphic of the individual layer where boxes can be moved via drag and drop, rotated, added/deleted, and multiselected, and patterned. The following shows what each command does.

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Step 19e. – If changes were made to the pattern, a prompt will pop up to save the changes, select save pattern.

Do you want to save this pattern?

Select Pattern again to go back to the visualization.

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Step 19f. – This will have created a new pattern. Each unique layer pattern will be given a name in the convention of Layer Type # where the "#" is replaced sequentially for each unique pattern. Once the pattern types are configured, they can be deleted, drag and drop to a particular order, and duplicated as needed. These options are all found in the same drop down from step 19b.

Step 19g. – When the unique custom stack has been configured, return to step 21.

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