

Exsys Corvid® Core for Apple Macintosh
Application How-To

Regulatory Expert Systems

IRS Regulations on Home Office Deductions



Exsys Corvid Core Application “How-To”

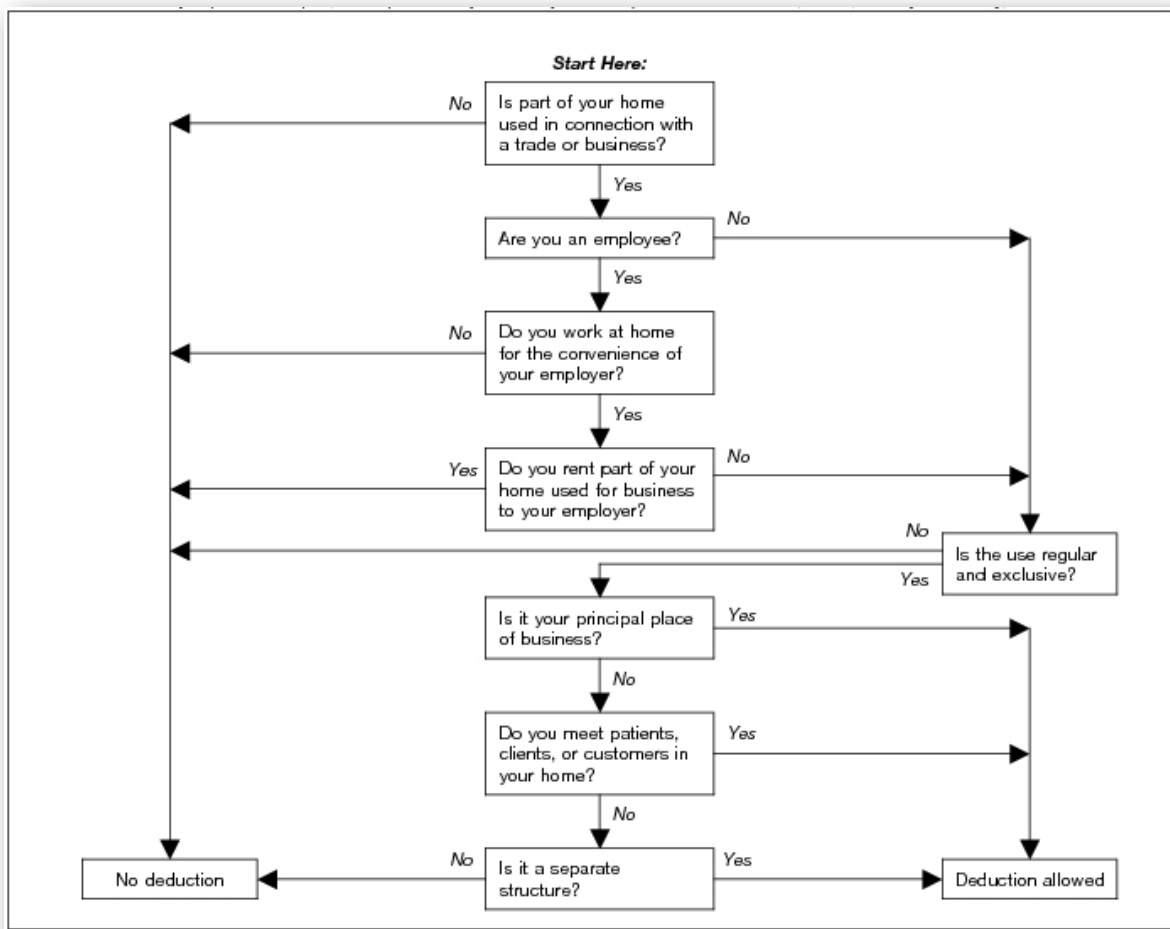
This system is a demonstration of how an existing logic diagram can be easily converted into an Exsys Corvid Core system and delivered online.

Even relatively simple logic, when delivered in a text or diagrammatic form can be difficult for end users to follow and reach the correct conclusions. Exsys Corvid Core converts the regulations to a form that can be delivered online via the Exsys Inference Engine. This produce an interactive session in the end user’s browser that asks specific, relevant questions to arrive at detailed situation specific advice.

Determining if a home office qualifies for a tax deduction is a common question. The IRS has a detailed explanation of the regulations at:

http://www.irs.gov/publications/p587/ar02.html#en_US_2012_publink1000226292

This contains many details, but a main part of the decision process is in a logic diagram.



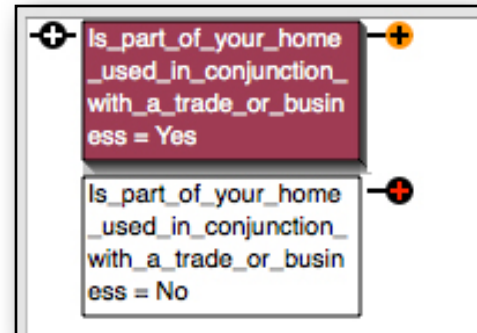
While, with a little care, this diagram can be used to reach the correct conclusion, it is easy to make a mistake or lose track of which branch you are on.

Converting this to Exsys Corvid Core rules greatly simplifies it and makes it far easier for end users to get the answers they need.

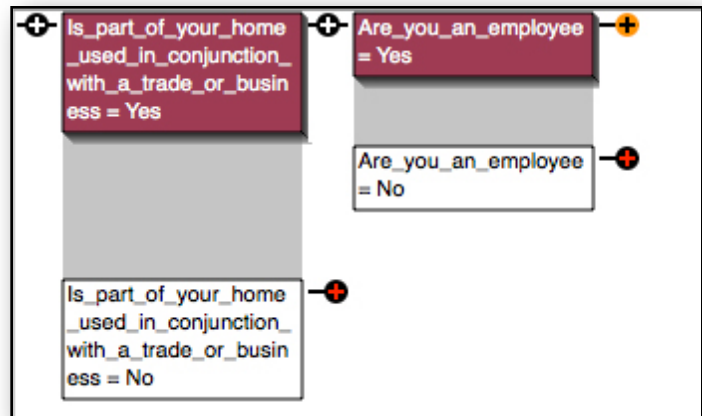
With a little experience with Exsys Corvid Core, this logic can be converted into Corvid rules in about 15 - 30 minutes.

Building the System in Exsys Corvid Core

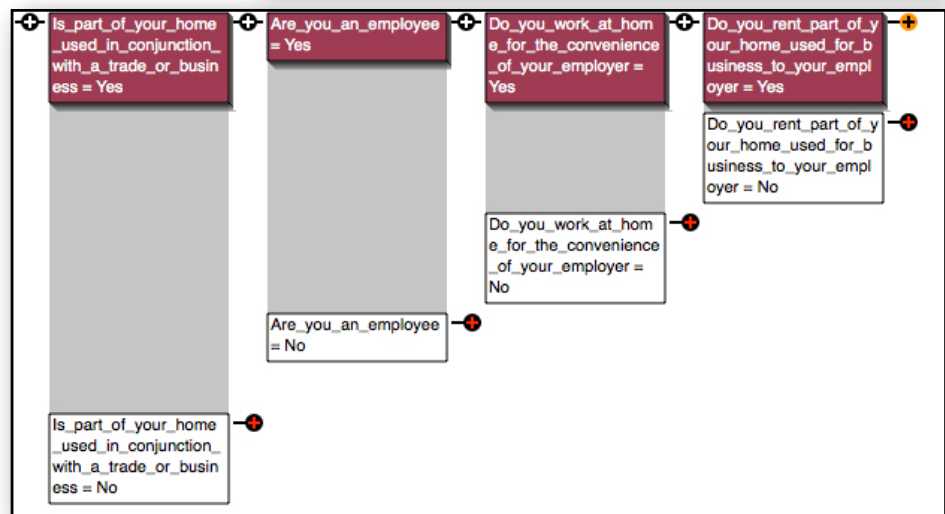
1. Since the diagram is the entire logic of the system, it is easy to know what all the questions and in the system will be, and the possible recommendations. Create a List variable for each of the decision boxes. Since the text is short, the name can just be the text. This will make the prompt the same text. Give each of the list variables possible values of “Yes” and “No”
2. Create 2 confidence variables for the possible conclusions of “No deduction” and “Deduction allowed”. (These could be other types of variables, but Confidence variables are a good choice for items of advice.)
3. Start a new Logic Block and add an IF node for the top question in the logic diagram. This should have a branch for each value.



4. Select the insertion point for the “Yes” value and enter IF nodes for the question in the logic diagram that the YES value for the first question leads to. Add this in the Corvid Logic Block with its 2 possible values.

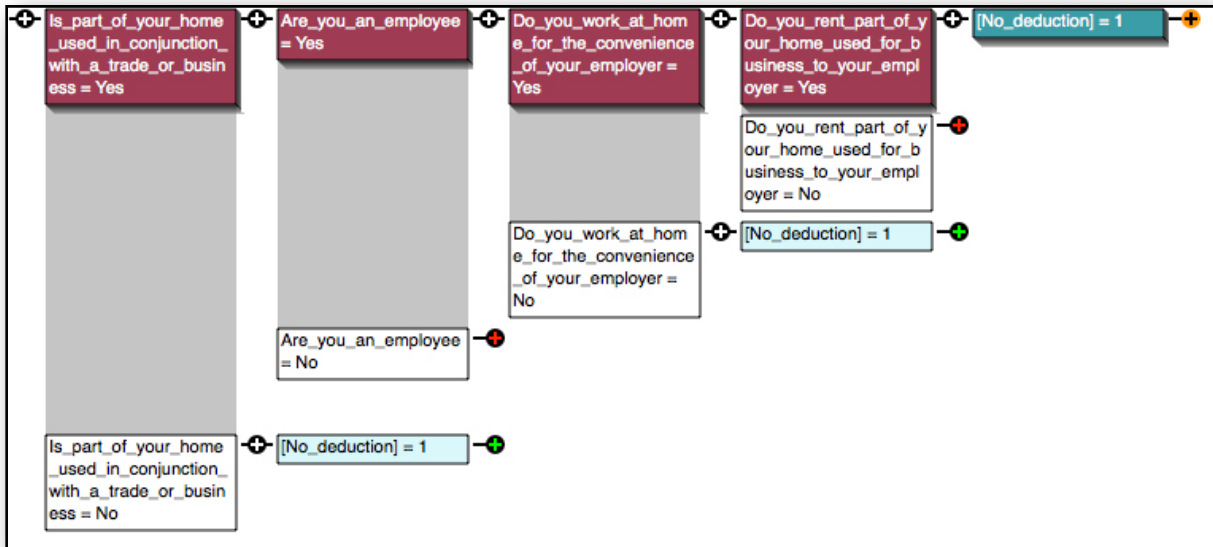


5. Repeat this again for next 2 variables, using the corresponding question from the logic diagram.

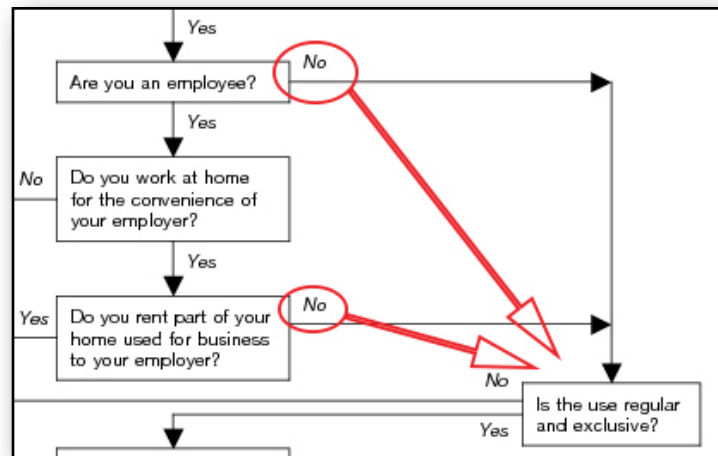


Exsys Corvid Core Application “How-To”

- Now much of the diagram is converted into the Logic Block. Since both the Yes and No values were added for each variable, the block has automatically expanded to cover many of the possibilities. Three of the branches go to the “No Deduction” conclusion. Add THEN nodes to set the “No Deduction” confidence variable to a value of 1.



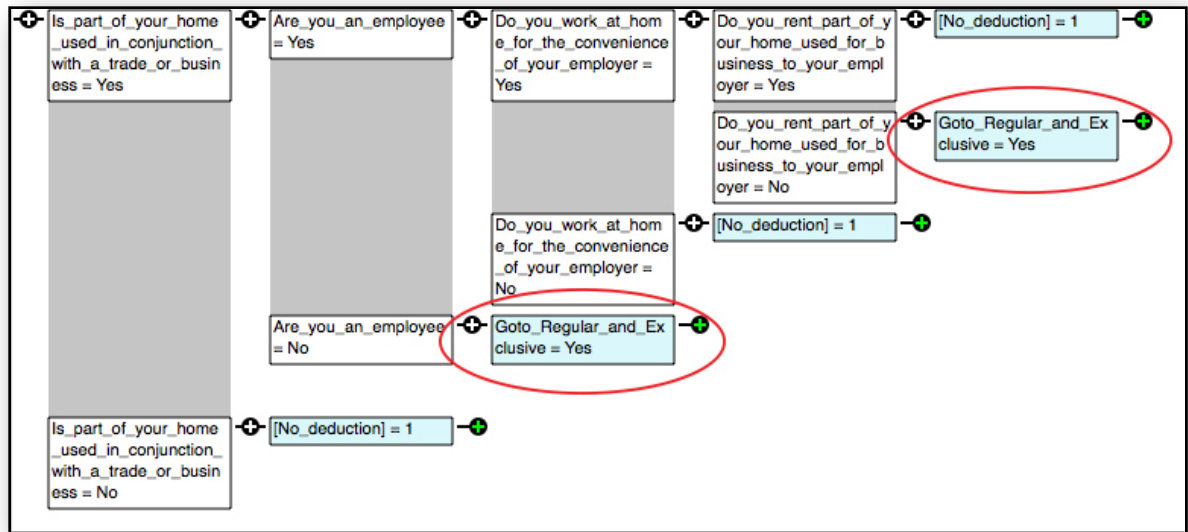
- Now we have to decide how to handle the last part of the logic. One approach would be to just build it out on the 2 remaining incomplete branches, in the same way as the rest of the tree. This would work, and since the decision logic is only a few more questions, it would not be much work, but it would require that the same identical logic be repeated in different sections of the Logic Block, which is not the best design. Any time there is more than one input to a node in the decision logic, it is best handled by making a new Logic Block. (See chapter X in the Corvid Core manual for more details). Here will add new Logic Block starting with the node that has multiple insertion points.



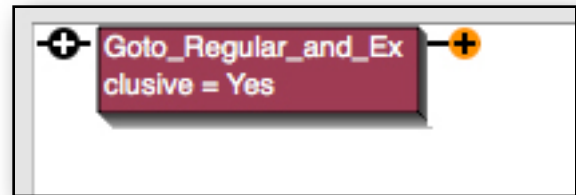
- First add a new control List variable. Since the node with multiple inputs is related to “Regular and Exclusive” use, name the variable “Goto_Regular_and_Exclusive”. Make it a List variable with values of Yes and No. The most important part in the variable window is to give it a Default value of “No” with the “Assign without asking end user” option set.

- Now set THEN values in the main Logic Block for the 2 incomplete branches to set the value of the new variable to Yes. If the logic goes down either of these branches, the “Yes” value will be set and the Logic Block with the rest of the logic will fire.

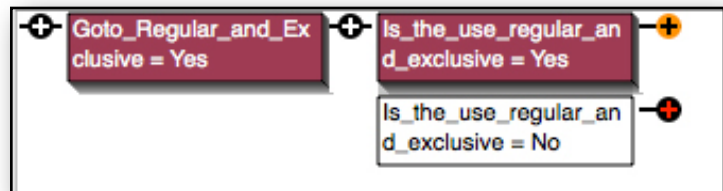
Exsys Corvid Core Application “How-To”



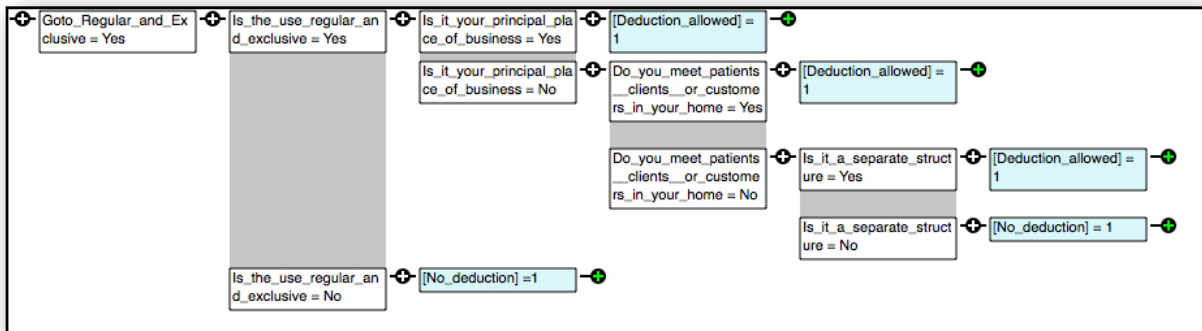
10. Now start a new Logic Block and enter a single IF node for the “Yes” value of the Goto_Regular_and_Exclusive variable. This will block all rules in the block unless the “Yes” value was set in the main tree. Since the default value is “no” with “Assign without asking end user” option, if the “Yes” value is not explicitly set by a rule, the “No” value will automatically be set without asking the end user, eliminating the rules from the new Logic Block.



11. Working off the new top node, add the 2 branches for the decision point in the logic diagram that has 2 inputs.



12. Build out the rest of the logic from these node to match the decision logic. Now this logic only occurs once in the system, preventing redundant rules and simplifying system maintenance.



13. Now go to the Command Block and set it to be a backward chaining system to derive the value of all Confidence variables, and then display a custom report.

Exsys Corvid Core Application “How-To”

14. Here the custom report is set to display the user’s input and then the system advice, though many other options could be used.

Results / Reports Display Commands

Report / Results Commands Filename:
HomeOfficeResults.rpt

Command	Format
TEXT "Home Office Deduction"	FORMAT: FONT=SansSerif SIZE=14 STYLE=Bold FCOLOR=57,122,100 BCOLOR=255,255,255 POSITION=Left INDENT=10 PROMPT_ONLY
TEXT " "	FORMAT: FONT=SansSerif SIZE=12 STYLE=Bold FCOLOR=57,122,100 BCOLOR=255,255,255 POSITION=Left INDENT=10 PROMPT_ONLY
TEXT "Based on your input of:"	FORMAT: FONT=SansSerif SIZE=12 STYLE=Bold FCOLOR=0,0,0 BCOLOR=255,255,255 POSITION=Left INDENT=10
Variables ASKED	FORMAT: FONT=SansSerif SIZE=10 STYLE=Bold FCOLOR=0,0,0 BCOLOR=255,255,255 POSITION=Left INDENT=20
TEXT " "	FORMAT: FONT=SansSerif SIZE=10 STYLE=Bold FCOLOR=0,0,0 BCOLOR=255,255,255 POSITION=Left INDENT=20
TEXT "The conclusion is:"	FORMAT: FONT=SansSerif SIZE=14 STYLE=Bold FCOLOR=0,0,0 BCOLOR=255,255,255 POSITION=Left INDENT=15
Confidence	FORMAT: FONT=SansSerif SIZE=14 STYLE=Bold FCOLOR=187,31,39 BCOLOR=255,255,255 POSITION=Left INDENT=15 PROMPT_ONLY
TEXT " "	FORMAT: FONT=SansSerif SIZE=12 STYLE=Bold FCOLOR=57,122,100 BCOLOR=255,255,255 POSITION=Left INDENT=10 PROMPT_ONLY
TEXT "For more details, click to see the IRS document"	FORMAT: FONT=SansSerif SIZE=10 STYLE=Italic FCOLOR=0,0,0 BCOLOR=255,255,255 POSITION=Left INDENT=10

▲ ▼ Delete Edit

The system can be run with either the Exsys Corvid Applet runtime or the Servlet Runtime using the default templates. The end user is automatically asked the minimum number of questions to reach a conclusion, which is then displayed.

Home Office Deduction Expert

Are you an employee?

☐ Yes

☐ No

OK

Exsys Corvid Core Application “How-To”

Home Office Deduction

Based on your input of:
Is part of your home used in conjunction with a trade or business? Yes
Are you an employee? Yes
Do you work at home for the convenience of your employer? No

The conclusion is:
No deduction

For more details, click to see the [IRS document](#)

Converting the decision logic into a Corvid expert system makes it far easier to deliver, much more reliable and less prone to end user errors. The system only took a very short time to build - probably considerably less than it took to draw the logic diagram in a graphics editor.

Just put the file Exsys Corvid Core generated up on a web server and the system is online world wide. If the Exsys Servlet Runtime is used, it can even be run from iPhones, iPads and other mobile devices, along with all browsers.

Servlet Version

While the system created for the Corvid Applet Runtime will work when run with the Corvid Servlet Runtime, it contains advice to the user that they must make sure their browser has any “popup blocker” turned off before clicking on links to other pages.

Many browsers consider html pages opened from a java applet to be “popups”. However the servlet is using only normal html links with “target=_blank”. Browsers do not consider this to be a popup, so the message is not needed when running with the servlet runtime. The Regulatory_S system is identical to the Regulatory system except for deleting the popup warning messages.

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