Q&A Session for Programming Languages Lecture 11

Session Number: 1205701074
Date: 2020-10-9
Starting time: 14:24

ANON - 14:17
Q: Can you have more attribute grammar rules than you have productions?
Priority: N/A
Ana L. Milanova - 14:24
A: Yes. You can have multiple rules per production.

ANON - 14:26
Q: I'm guessing that's the trick to 2(b) for homework 3?
Priority: N/A
Ana L. Milanova - 14:27
A: The key is to figure what attributes to track. One of course is the string that we synthesize. But you can have another one that records the precedence of the top-level operation.

ANON - 14:32
Q: Will postponing the exam and making today another review day affect the content coverd in this course?
Priority: N/A
Ana L. Milanova -
A: Not significantly. I expect to condense some coverage, however, I don't expect to drop topics.

ANON - 14:32
Q: Will homework 4 also be pushed back due to the changes?
Priority: N/A
Ana L. Milanova -
A: Yes, I am still working on the new schedule.

ANON - 14:32
Q: will today's lecture be another review for the exam? or will we be going into the next topic?
Priority: N/A
Konstantin Kuzmin - 14:38
A: Review.

ANON - 14:33

Q: Will the future topics in this class be more condensed as a result of the power outage or will certain topics be taken out due to lack of time? (if you don't know yet no problem, just wondering)
Priority: N/A

ANON - 14:33
Q: Afternoon everyone. On problem set 2, Q5 a, what do you mean by d(A, B, Q, R) does _____? Are you asking what the predicate does, what it calculates?
Priority: N/A
Ana L. Milanova - 16:23
A: Yes. That's what the question is asking. What algorithm does the predicate implement, and what do Q and R stand for within this algorithm.

ANON - 14:37
Q: we can submit more than once right?
Priority: N/A
Konstantin Kuzmin - 14:37
A: Correct.

ANON - 14:41
Q: Will homework 2 be graded before the exam?
Priority: N/A
Ana L. Milanova - 16:24
A: We will do our best but I cannot make promises.

ANON - 14:42
Q: Will an answer key for the practice problems be posted prior to the exam?
Priority: N/A
Konstantin Kuzmin - 14:42
A: Yes, the day before the exam.

ANON - 14:43
Q: For the exam, since its on submitty, will submitty lock us out after accessing the exam for 2 hours?
Priority: N/A
Konstantin Kuzmin - 14:44
A: It will not lock you out but if you make submissions after 120 minutes from the momet you opened the exam page for the first time, it will start charging you a penalty.
Konstantin Kuzmin - 14:45
A: If you make a submission after 11 pm EDT, it will be an immediate zero since Submitty will consider it to be outside of the

allowed time window.

ANON - 14:45
Q: For the Exam, if asked to translate (x | y)* to English, could we just say all strings of x,y or would we have to say all strings of x, y including the empty string?
Priority: N/A
Ana L. Milanova - 16:26
A: Either way should be fine. When we say "all strings" this includes the empty string.

ANON - 14:45
Q: Thank you for moving the exam date! I was having problems with electicity even up until last night which made it very difficult to review.
Priority: N/A
Konstantin Kuzmin - 14:46
A: You are welcome! We always try to act in the best interest of the students.

ANON - 14:49
Q: if it was (w|z)+ (no *) then epsilon is not included, right?
Priority: N/A
Ana L. Milanova - 16:26
A: Correct.

ANON - 14:49
Q: Can we have if-else statements in attribute grammars?
Priority: N/A
Steven Haussmann - 14:49
A: Yes, you can include basic things like if-then-else in your rules
Ana L. Milanova -
A: Yes. You can include pretty much anything in your rules!

ANON - 14:50
Q: how about (w|z*)+? epsilon will just show up for z?
Priority: N/A
Steven Haussmann - 14:50
A: It won't "show up for z" -- but it is true that you can produce epsilon, by choosing the z* option

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ANON - 14:51
Q: What about the opposite? Such as (R|W)+ which is like all strings

of Rs and Ws but not including the empty string, do you have to say that explicitly
Priority: N/A
Ana L. Milanova - 16:29
A: Yes, this should be said explicitly. Because if you say "all strings of r's and w's", that includes the empty string as well.

ANON - 14:52
Q: In the English description for the regular expressions should we explicity say if it includes the empty string?
Priority: N/A
Steven Haussmann - 15:12
A: Feel free to. However, I think we'll be assuming that "any string" includes the empty string; conversely, you should explicitly state if the string cannot be empty

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ANON - 14:53
Q: Can (w*|z*)* only produce a string of either w's or z's, or can it also produce a string with w's AND z's?
Priority: N/A
Steven Haussmann - 15:05
A: It can produce either. The Kleene star means that you can have zero or more instances of whatever came before it -- so you have zero or more instances of (w*|z*)
Steven Haussmann - 15:05
A: *both at once, not "either"; should clarify

ANON - 14:52
Q: The starting symbol is always FOLLOWed by $ right?
Priority: N/A
Ana L. Milanova - 16:31
A: Correct. The starting nonterminal in the grammar, say S, is always followed by $. We usually augment the original grammar adding another starting nonterminal to make this explicit: Start -> S $$.

ANON - 14:53
Q: For this one, should there have been a Production with the $ End Input Symbol since that is mentioned in the Table?
Priority: N/A
Ana L. Milanova - 16:31
A: There may be or there may not be one. That production is sometimes left implicit, and sometimes made explicit.

ANON - 14:53
Q: Is there anway you can show the process of filling out an LL(1)

table with First and Follow set information? I have been confused on how to know which production is appropriate to add
Priority: N/A
        Ana L. Milanova - 16:32
        A: I hope we did that in class, but if you still have questions, follow up on submitty.

ANON - 14:53
Q: epsilon can be in the FIRST set but we do not include epsilon in any FOLLOW sets, right?
Priority: N/A
        Steven Haussmann - 15:09
        A: Repeating Milanova's answer: Yes, that is correct. ε being in FIRST tells us that the symbol can turn into an empty string. ε being in FOLLOW doesn't make sense -- it tells you what can come next

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ANON - 14:54
Q: what about the] before the second S?
Priority: N/A
        Ana L. Milanova - 16:33
        A: We have S -> [S]S. This production makes "]" be in FOLLOW(S).

ANON - 14:56
Q: If we had X -> epsilon terminal then the FIRST of X would be terminal and not epsilon right?
Priority: N/A
        Steven Haussmann - 15:07
        A: You only care about ε if it's the only terminal in the result. X => ε x is identical in meaning to X => x

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ANON - 14:57
Q: For that question, Problem set 1, Q3, I assumed that S was the start.
Priority: N/A
        Ana L. Milanova - 16:33
        A: Yes, S is the starting nonterminal in the original grammar.

ANON - 14:58
Q: so "]" doesn't follow S even though it does in the grammar (e.g. S -> [S]S)?
Priority: N/A
        Ana L. Milanova - 16:34
        A: "]" does follow S, due to S->[S]S as you say.

ANON - 15:00
Q: We don't include eps in the follow sets and the predict sets right?

Priority: N/A
Ana L. Milanova - 16:34
A: Correct.

ANON - 15:02
Q: How do we get the [terminal in the Follow(T)?
Priority: N/A
Ana L. Milanova - 16:36
A: E.g., S => [S]S => [TS]S => [T]S => ... We have a sentential form where T is immediately followed by].
Ana L. Milanova - 16:38
A: Sorry, I answered "How do we get] in FOLLOW(T)". Here is answer for [. S => TS = > T[S]S => ... We have a sentential form where [immediately follows T.

ANON - 15:03
Q: To add to my previous question, if possible can you please show an example of filling out an LL1 table with multiply defined entries and how you figure that out?
Priority: N/A
Ana L. Milanova - 16:36
A: We can go back to the Dangling Else grammar we discussed earlier. The entry [else_part, else] has 2 productions in it, which makes it "multiply-defined".

ANON - 15:04
Q: how come for the follow(T), there is a],$, and)?
Priority: N/A
Ana L. Milanova - 16:38
A: I answered this (by mistake) in an earlier question (ANON - 15:02).

ANON - 15:06
Q: Can we also say: Yes it is LL(1) because each entry in the parse table has an most one production..?
Priority: N/A
Steven Haussmann - 15:08
A: Yes, that would mean that your grammar can be parsed unambiguously with only one symbol of lookahead
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ANON - 15:09

Q: Can you explain again how you got the follow(T)
Priority: N/A
        Ana L. Milanova - 16:40
        A: We have S -> TS and because S derives epsilon, we have that FOLLOW(S) is included into FOLLOW(T). This adds] and $$. Similarly because of X -> TX, we have that FOLLOW(X) is included in the follow of T. This adds).

ANON - 15:09
Q: Can you go over how to get follow of T again?
Priority: N/A
        Ana L. Milanova - 16:40
        A: Answered just above.

ANON - 15:14
Q: how come for the follow(T), there is a],$, and)?
Priority: N/A
        Ana L. Milanova - 16:40
        A: Answered just above.

ANON - 15:23
Q: I know we have to start with the base case walk(null, [])., but not quite clear as to why.
Priority: N/A
        Steven Haussmann - 15:25
        A: The result of traversing a null tree should be the empty list. So, that's your base case.

ANON - 15:24
Q: A side question, if given a parse tree, the way to assess precedence is by ordering the productions by level right?
Priority: N/A
        Steven Haussmann - 15:26
        A: You can infer it from where things wind up on the tree, yes. It's a bit counterintuitive: low-precedence operators will appear first, since they'll wind up applying to the result of higher-precedence operations

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ANON - 15:26
Q: Also, what role does it play in binding the variable to the list of sequence.
Priority: N/A
        Steven Haussmann - 15:26
        A: If you have a base case of walk(null, []), then invoking walk(null, R) will bind [] to R.

ANON - 15:26
Q: is there any way to do this without append?
Priority: N/A
Steven Haussmann - 15:27
A: You would wind up re-implementing append. You could not simply use the [Head|Tail] syntax, because that would give you a list containing the entire first list as an element.
Steven Haussmann - 15:27
A: So just use append :)

ANON - 15:26
Q: so are we assuming that the bintree's will always appear in order here?
Priority: N/A
Steven Haussmann - 15:28
A: The structure of the tree determines its order. The entries could be numbers in ascending order, or something without an apparent order.

ANON - 15:27
Q: scoping
Priority: N/A

ANON - 15:27
Q: when writing prolog code, can we use append, memeber, any predicates already known by prolog?
Priority: N/A
Steven Haussmann - 15:28
A: Yes, you can.

ANON - 15:27
Q: Can you go over how this is preorder traversal again?
Priority: N/A
Ana L. Milanova - 16:41
A: We prepend N, the label of the current node. Then we compute the preorder of the left child, followed by the preorder of the right.

ANON - 15:27
Q: This seems to visit children before parents first
Priority: N/A

ANON - 15:27
Q: 2nd part of Prolog question of backexam is confusing to me
Priority: N/A
        Steven Haussmann - 15:29
        A: You'll need to specify which problem set you're looking at.

ANON - 15:28
Q: What is the fringe of a tree?
Priority: N/A
        Ana L. Milanova - 16:41
        A: The leaves of the tree.

ANON - 15:29
Q: Sorry, 2nd backexam
Priority: N/A

ANON - 15:31
Q: Heey, I voted for Prolog. :-(. It's all good though since I'd like you to go over the scoping question. Want to make sure my answer is correct.
Priority: N/A

ANON - 15:39
Q: Let's say we have two procedures, P and Q, with Q nested within P. P has a declaration of a variable x and Q (with no declaration of an x) has an expression referring to P.x. If P and Q are called and recurse such that there are (sorry, long question...)
Priority: N/A

ANON - 15:41
Q: multiple frames of P's and Q's on the stack, will Q's x refer to P.x from the most recent frame of P or otherwise? and do each of these P.x's from the frames of P have different locations on the stack?
Priority: N/A
        Ana L. Milanova - 16:43
        A: The static link refers to the most recent frame of the statically enclosing procedure. (When you have multiple frames for that procedure on the stack, which is possible of course.) And yes, when you have multiple frames for a procedure, say P, then each local variable in the procedure, say P.x gets a location in each frame.

ANON - 15:42
Q: If this was an exam and if i wasn't familiar with the write notation and wrote "B: ", 1"B: ", 2"A: ", 2, would I be docked points?

Priority: N/A
Ana L. Milanova - 16:43
A: No, you won't be docked points. As long as answer is completely clear.

ANON - 15:43
Q: If we had a procedure, E, enclosed in A, would E's static link point to A or main?
Priority: N/A
Konstantin Kuzmin - 15:44
A: A

ANON - 15:43
Q: can you speak to how static chaining works with pages? or is that not relevant to third-class functions?
Priority: N/A
Ana L. Milanova - 16:44
A: I am not sure what you mean... Sorry!

ANON - 15:44
Q: Consider the same procedure declarations in the current question, except procedure B is declared in procedure A instead of main. What would the static linking look like with the current stack we have on screen?
Priority: N/A
Ana L. Milanova - 16:45
A: Each B's static link will point to the most recent frame of A on the stack.

ANON - 15:44
Q: For the Procedure Names, can we just write A and specify the values of parameter within the Frame itself?
Priority: N/A
Ana L. Milanova - 16:46
A: When unambiguous, yes. But if there is multiple A's, you have to specify the enclosing procedures.

ANON - 15:44
Q: Specifically, which A would the frames for B point to for the static link.
Priority: N/A
Ana L. Milanova - 17:23
A: The most recent frame of A. (The A closest to the current frame of B on the stack. Assuming that B is directly enclosed in A.)

ANON - 15:45
Q: And if the variable it is trying to access is only defined in main, will there be an error by the compiler or it will try to find the variable in main?
Priority: N/A
Ana L. Milanova - 17:39
A: Generally, there should not be. With either static or dynamic scoping, we should be able to bind to main's variable, if no other variables are in scope.

ANON - 15:46
Q: If procedure B is nested inside procedure A, and there are multiple frames of A on the stack before a frame of B, that frame of B's static link will point to the most recent/closest on stack frame of A, and potentially use variables in that frame, right?
Priority: N/A
Steven Haussmann - 15:56
A: Just to summarize what Milanova discussed: The static link will be to the closest instance of the procedure on the stack.

ANON - 15:51
Q: If we have procedure C nested within B, nested within A, is it possible for A to call C without B being called? If so, the frame C cannot have a static link pointing to a frame of B so would its static link point to the calling frame of A?
Priority: N/A
Steven Haussmann - 16:09
A: No, A cannot see C. It can only see things declared immediately inside of it, as well as anything in which it was declared. You're right to note that the static link would make no sense -- it would need to find an instance of B, but there is none!

ANON - 15:52
Q: Oh. So it doesn't print A: 101 because the value of 101 is in the 3rd stack, the first stack of B, and the dynamic link of A points to the B directly of A...?
Priority: N/A
Ana L. Milanova - 17:40
A: Correct.

ANON - 15:56
Q: We can call B from within A, correct?
Priority: N/A
Steven Haussmann - 15:56
A: Correct.

ANON - 15:56
Q: Could you repeat the line about the static links?
Priority: N/A
Steven Haussmann - 15:57
A: If there are multiple instances of the enclosing procedure on the stack, then the static link will point at the nearest frame on the stack. You will encounter this if there is mutual recursion between procedure and an enclosed procedure.

ANON - 15:56
Q: So the Key Takeaway is that Static Link points to the Most Recent Enclosing Subroutine even in Recursion
Priority: N/A
Steven Haussmann - 15:58
A: Yes. However, remember that which procedure it points to is still static; we're just deciding which particular instance of the function on the stack that we will be searching for variables.

ANON - 15:57
Q: So B and A will always point to main, is that correct?
Priority: N/A
Steven Haussmann - 15:57
A: No, B's static link will point to A. A's static link goes to main.
Steven Haussmann - 16:00
A: Oh, sorry! I was considering the modified example, where B is contained inside of A.
Steven Haussmann - 16:00
A: If you're looking at the original problem, both A and B and statically linked to main.

ANON - 15:59
Q: If procedure B is nested inside procedure A, and B is called from main, would the static link for B point to main (instead of A)?
Priority: N/A
Steven Haussmann - 16:03
A: The procedure targeted by the static link does not depend on what you're doing at runtime. So, it will still point to A. I believe that you can't invoke B from main.

ANON - 15:59
Q: Not sure if I missed this, but have you said how many questions (and of each type) there will be on the exam?
Priority: N/A

ANON - 15:59
Q: Just saw someone asked if B and A Static Links point to Main in this Example, and it was answered that this is not true, but in this Example it seems to be true.
Priority: N/A
        Steven Haussmann - 16:00
        A: See the correction above

ANON - 16:00
Q: for the answer, "No, B's static link will point to A. A's static link goes to main." , you're refering to the diagram professor drew, NOT the printed procedure?
Priority: N/A
        Steven Haussmann - 16:01
        A: Yes, that is correct.

ANON - 16:01
Q: So in the Give Problem, Aand B could call Main() ?
Priority: N/A
        Steven Haussmann - 16:01
        A: Yes, they could. I don't think you'll be seeing that, though.

ANON - 16:01
Q: NonTechnical Question: Are there any extra credit questions for the exam?
Priority: N/A
        Ana L. Milanova - 17:40
        A: No, there won't be.

ANON - 16:01
Q: From another Q&A: So B and A will always point to main, is that correct?, but prof Milanava showed that B's static link points to main, why is that the case?
Priority: N/A
        Ana L. Milanova - 17:41
        A: Because in the program in our example, both A and B are nested in main. So their static links will point to main.

ANON - 16:01
Q: so in this example the static link and dynamic link for frame B always point to most recent frame of A before current frame?
Priority: N/A

Steven Haussmann - 16:02
A: In the drawn example, yes, they would happen to work in the same way.

ANON - 16:01
Q: The next Prolog question
Priority: N/A

ANON - 16:02
Q: Going over problem 5b on the second exam (Prolog) would be super helpful, if we could do that. Thanks
Priority: N/A

ANON - 16:04
Q: will this review session be available later in video form?
Priority: N/A
Steven Haussmann - 16:07
A: Yes, it is being recorded.

ANON - 16:06
Q: Can you explain preorder again?
Priority: N/A
Steven Haussmann - 16:07
A: Preorder traversal outputs the node, then the preorder traversal of its left side, then the preorder traversal of the right side.
Steven Haussmann - 16:08
A: Compare this to an inorder traversal, where you output the inorder traversal of the left side, then the node, then the inorder traversal of the right side

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ANON - 16:09
Q: Ah, so since the preorder boolean expressions are unambiguous in how operations are grouped, trying all possible break downs into left and right operands (via append) works because there's only one possible and correct way to break the expression down?
Priority: N/A
Steven Haussmann - 16:10
A: Yes, the preorder traversal should correspond to a prefix notation expression.

ANON - 16:09
Q: How does or work if Vl and Vr are both 1? wouldnt it then be 2 or am i missing something?

Priority: N/A

Ana L. Milanova - 17:59

A: We had a special case for 2 one's: eval_op(or,1,1,1):-!. The cut makes it so that when this case matches, the interpreter won't try the other or, where we add the two values.

ANON - 16:10

Q: oops ignore that, just read the base case for that

Priority: N/A

ANON - 16:10

Q: Prolog checks them in sequential order, correct? So if I had that first (or,1,1,1) statement directly after the more general statement, it wouldn't work?

Priority: N/A

Steven Haussmann - 16:11

A: It will try all of the available rules. If one fails, it tries the next one.

ANON - 16:10

Q: in the last eval_op, should it be (and,VL,VR,V) :- .... instead of (and, VL,VL,V) :- ...

Priority: N/A

Ana L. Milanova - 18:00

A: Yes, it should be. Sorry if I mistyped.

ANON - 16:11

Q: Asked this earlier, but didn't get a response: Not sure if I missed this, but have you said how many questions (and of each type) there will be on the exam?

Priority: N/A

Ana L. Milanova - 18:01

A: No, we have not specified that. We expect a few questions but they may be with multiple parts.

ANON - 16:18

Q: Will there be office hours today?

Priority: N/A

Ana L. Milanova - 18:01

A: Yes.

ANON - 16:21

Q: for 5a, what does "d(A, B, Q, R) does" expects?

Priority: N/A

Ana L. Milanova - 18:01
A: Bound A and B. Outputs Q and R.

ANON - 16:22
Q: for the hw problem 2 I am a bit confused about what we are being asked to do? Are we looking for the term(b, _) stuff?
Priority: N/A

Ana L. Milanova - 18:02
A: I'm assuming you mean HW3? We are looking for strings which show the infix expression without redundant parentheses. You can think of term(b,S) and S being that infix expression.

ANON - 16:23
Q: or are we looking for like true/false values?
Priority: N/A

Ana L. Milanova -
A: In the HW, we are not looking to evaluate into True or False. We are looking to "translate" the original prefix expression into an infix one. We are not evaluating.