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Declaration CFG

<dec> --> DT <dec_choice>
<dec_choice> --> [ ] ID <init_arr><list_arr> | ID <init><list>
<init> --> = <OE> | ~
<list> --> ; | , ID <init> <list>

<init_arr> -- > = <init_arr_choice> | ~
<init_arr_choice> --> new DT[<OE>]<return_choice> | { <PL>} | ID |~
<list_arr> --> ; | , ID <init_arr> <list_arr>

First(<dec>) → DT	
First<dec_choice>) → [, ID	
First(<init>) → = , ~	**Follow(<init>) → , , ;**
First(<list>) → ; , ,	
First(<init_arr>) → = , ~	**Follow(<init_arr>) → , , ;**
First(<init_arr_choice>) → new, { , ID , ~	**Follow(<init_arr_choice>) → , , ;**
First(<list_arr>) → ; , ,	

Object Declaration

<obj_dec> → ID <obj_dec_choice>
<obj_dec_choice> → [] ID <obj_init_arr><obj_list_arr> | ID <obj_init><obj_list>
<obj_init> → = <obj_init_choice> | ~
<obj_init_choice> → new ID(<PL>) | <OE>
<obj_list> --> ; | , ID <obj_init> <obj_list>

<obj_init_arr> → = <obj_init_arr_choice> | ~
<obj_init_arr_choice> → new ID [<OE>] <return_obj_choice> | { <PL_dec>} | ID |~
<obj_list_arr> → ; | , ID <obj_init_arr> <obj_list_arr>

First(<obj_dec>) → DT	
First(<obj_dec_choice>) → [, ID	
First(<obj_init>) → = , ~	**Follow(<obj_init>) → , , ;**
First(<init_choice>) → new , int_const, char_const , string_const, float_const, true, false, (, ! , this, ID , inc_dec	
First(<obj_list>) → ; , ,	
First(<obj_init_arr>) → = , ~	**Follow(<obj_init_arr>) → , , ;**
First(<obj_init_arr_choice>) → new, { , ID , ~	**Follow(<init_arr_choice>) → , , ;**
First(<obj_list_arr>) → ; ,	

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SST (Single Statement)

<SST> → <if_else> | <while_st> | <for_st> | inc_dec<this_st> ID <X> ;| this . ID <XY_SST> | ID<ZZZ> | <try_st> | DT <dec_choice> | continue; | break; | ;

<ZZZ> → ID <obj_init><obj_list> | [<XY_dec> | <XY1_SST> | (<PL>)<XY2_SST>
<XY_dec> → <OE>] <XY1_SST> |] ID<obj_init_arr><obj_list_arr>
<XY_SST> → (<PL >) <XY2_SST> | . ID <XY_SST> | inc_dec; | = <OE> ; | [<OE>] <XY1_SST> | ;
<XY1_SST> →. ID <XY_SST> | inc_dec ; | = <OE>;
<XY2_SST> → . ID <XY_SST> | [<OE>]<XY1_SST>|;

<MST> → <SST><MST> | ~

First(<SST>) → if, while, for, try, this, inc_dec, ID, DT, continue, break	
First(<ZZZ>) → ID, (, . , inc_dec, = , [	
First(<XY_dec>) → int_const, char_const , string_const, float_const, true, false, (, ! , this, ID , inc_dec,]	
First(<XY_SST>) → (, . , inc_dec , = , ; , [	
First(<XY1_SST>) → . , inc_dec , =	
First(<XY2_SST>) → . , ; , [	
First(<MST>) → if, while, for, try, this, inc_dec, ID, DT, break, continue, ~	**Follow(<MST>) → }**

SST1 (Includes return keyword)

<SST1> → <if_else> | <while_st> | <for_st> | inc_dec<this_st> ID <X> ;| this . ID <XY_SST> | ID<ZZZ> | <try_st> | DT <dec_choice> | <return_st> | ;

<MST1> → <SST1><MST1> | ~

First(<SST1>) → if, while, for, try, this, inc_dec, ID, DT, return	
First(<MST1>) →if, while, for, try, this, inc_dec, ID, DT, return, ~	Follow(<MST1>) → }

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For Statement

<for_st> → for(<c1><c2>;<c3>) { <MST> }
<c1> → inc_dec <this_st>ID<X>; | DT <dec_choice> | this . ID <X><c1_choice2> | ID <for_ZZZ> | ;
<c1_choice2> → = <OE> ; | inc_dec ;
<c2> → <OE> | ~
<c3> → <this_st>ID<X> <c3_choice><c3_more_choice> | inc_dec <this_st>ID<X><c3_more_choice> | new ID(<PL>)<c3_more_choice> | ~
<c3_choice> → inc_dec | = <OE>
<c3_more_choice> → , <c3_must> <c3_more_choice> | ~
<c3_must> → <this_st>ID<X> <c3_choice> | inc_dec <this_st>ID<X> | new ID(<PL>)

<for_ZZZ> → ID <obj_init><obj_list> | [<XY_dec> | <for_XY1_SST> | (<PL>)<for_XY2_SST>
<for_XY_dec> → <OE>] <for_XY1_SST> |] ID<obj_init_arr><obj_list_arr>
<for_XY_SST> → (<PL >) <for_XY2_SST> | . ID <for_XY_SST> | inc_dec; | = <OE> ; | [<OE>] <for_XY1_SST> | ;
<for_XY1_SST> →. ID <for_XY_SST> | inc_dec ; | = <OE>;
<for_XY2_SST> → . ID <for_XY_SST> | [<OE>]<for_XY1_SST>

First(<for>) → for	
First(<c1>) → inc_dec, DT,this, ID , ;	
First(<c1_choice2>) → = , inc_dec	
First(<c2>) → int_const, char_const , string_const, float_const, true, false , (, ! , this, ID , inc_dec , ~	**Follow(<c2>) → ;**
First(<c3>) → this, ID , inc_dec, new ,~	**Follow(<c3>) →)**
First(<c3_choice>) → inc_dec, =	
First(<c3_more_choice>) → , , ~	**Follow(c3_more_choice>) →)**
First(<c3_must>) → this, ID , inc_dec , new	
First(<for_ZZZ>) → ID, (, . , inc_dec, = , [	
First(<for_XY_dec>) → int_const, char_const , string_const, float_const, true, false, (, ! , this, ID , inc_dec,]	
First(<for_XY_SST>) → (, . , inc_dec , = , ; , [	
First(<for_XY1_SST>) → . , inc_dec , =	
First(<for_XY2_SST>) → . , [	

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Return Statement

<return > → return <either_return> ;
<either_return> → <OE>| new <return1> | ~
<return1> → ID <return2> | DT [<OE>]<return_choice>
<return2> → (<PL>) | [<OE>] <return_obj_choice>
<return_obj_choice> → { <PL_dec> } | ~
<return_choice> → { <PL> } | ~

First(<return>) → return	
First(<either_return>) → int_const, char_const , string_const, float_const, true, false, (, ! , this, ID , inc_dec , new , ~	**Follow(<either_return>) → ;**
First(<return1>) → ID , DT	
First(<return2>) → (, [	
First(<return_obj_choice>) → { , ~	**Follow(<return_obj_choice>) → , , ;**
First(return_choice>) → { , ~	**Follow(<return_choice>) → , , ;**

PL_dec (Parameter List Declaration)

<PL_dec> → new ID(<PL>)<PL1_dec> | <OE> <PL1_dec>
<PL1_dec> → , <PL1_choice><PL1_dec> | ~
<PL1_choice> → new ID(<PL>) | <OE>

First(<PL_dec>) -> new , int_const, char_const , string_const, float_const, true, false, (, ! , this, ID , inc_dec	
First(<PL1_dec>) -> , , ~	**Follow(<PL_dec>) -> }**
First(<PL1_choice>) -> new , int_const, char_const , string_const, float_const, true, false, (, ! , this, ID , inc_dec	

PL (Parameter List)

<PL> → <OE> <PL1> | ~
<PL1 > → , <OE> <PL1> | ~

First(<PL>) -> int_const, char_const , string_const, float_const, true, false, (, ! , this, ID , inc_dec	
First(<PL1>) -> , , ~	**Follow(<PL>) ->) , }**

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Const (Constants)	
<const> → string_const | int_const | char_const | float_const | true | false	
First(<const>) → string_const, int_const, char_const, float_const, true, false	

Def (Function Parameter list while defining)	
<def> → <ret_type> ID <more_def> | ~ <more_def> → , <ret_type> ID <more_def> | ~ <ret_type> → DT <ret_choice> | ID <ret_choice> <ret_choice> → [ ] | ~	
First(<def>) →DT , ID , ~	**Follow(<def>) →)**
First(<more_def>) → , , ~	**Follow(<more_def>) →)**
First(<ret_type>) → DT , ID	
First(<ret_choice>) → [, ~	**Follow(<ret_choice>) →) , , , ID**

X (Always end on variable)	
<X> → [<OE>] <X1> | (<PL>) <X2> | . ID<X> | ~ <X1> → .ID<X> | ~ <X2> → .ID<X> | [<OE>].ID<X>	
First(<X>) → [, (, . ,~	**Follow(<X>) → ; , pm , rop, mdm , && , || ,) ,] , , , } , =, inc_dec**
First(<X1>) → . , ~	**Follow(<X1>) → ; , pm , rop, mdm , && , || ,) ,] , , , } , =, inc_dec**
First(<X2>) → . , [	

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OE (Expression)

<OE> → <AE> <OE'>
<OE'> → || <AE><OE'> | ~
<AE> → <RE> <AE'>
<AE'> → &&<RE><AE'> | ~
<RE> → <PE><RE'>
<RE'> → rop <PE><RE'>|~
<PE> → <ME><PE'>
<PE'> → pm <ME><PE'>|~
<ME> → <F><ME'>
<ME'> → mdm <F><ME'>|~
<F> → <const> | (<OE>) | ! <F> | <this_st> ID <XY> | inc_dec <this_st> ID <X>
<XY> → [<OE>] <XY1> | (<PL>) <XY2> | .ID <XY> | inc_dec | ~
<XY1> → .ID<XY> | inc_dec | ~
<XY2> → .ID <XY> | [<OE>] <XY1> | ~

First(<OE>) → int_const, char_const , string_const, float_const, true, false, bool, var, (, ! , this, ID , inc_dec	
First(<OE'>) → || , ~	**Follow(<OE'>) →) , } ,] , , , ;**
First(<AE>) → int_const, char_const , string_const, float_const, true, false, bool, var, (, ! , this, ID , inc_dec	
First(<AE'>) → && , ~	**Follow(<AE'>) → || ,) , } ,] , , , ;**
First(<RE>) → int_const, char_const , string_const, float_const, true, false, bool, var, (, ! , this, ID , inc_dec	
First(<RE'>) → rop , ~	**Follow(<RE'>) → && , || ,) , } ,] , , , ;**
First(<PE>) → int_const, char_const , string_const, float_const, true, false, bool, var, (, ! , this, ID , inc_dec	
First(<PE'>) → pm , ~	**Follow(<PE'>) → rop , && , || ,) , } ,] , , , ;**
First(<ME>) → int_const, char_const , string_const, float_const, true, false, bool, var, (, ! , this, ID , inc_dec	
First(<ME'>) → mdm, ~	**Follow(<ME'>) → pm , rop , && , || ,) , } ,] , , , ;**
First(<F>) → int_const, char_const , string_const, float_const, true, false, bool, var, (, ! , this, ID , inc_dec	Follow(<F>) → mdm, pm , rop , && , || ,) , } ,] , , , ;
First(<XY>) → [, (, . , inc_dec , ~	**Follow(<XY>) → mdm, pm , rop , && , || ,) , } ,] , , , ;**
First(<XY1>)→ . , inc_dec, ~	**Follow(<XY1>) → mdm, pm , rop , && , || ,) , } ,] , , , ;**
First(<XY2>) → . , [, ~	**Follow(<XY2>) → mdm, pm , rop , && , || ,) , } ,] , , , ;**

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Class Statement

<class_st> → <class_choice> <class_def>
<class_def> → class ID <inhrt> { <CB> }
<class_choice> → static | abstract | final | ~
<inhrt> → extends ID <inhrt_choice> | ~
<inhrt_choice> → , ID <inhrt choice> | ~
<CB> → static <CB_Class>| <access_modifiers> <static_choice> <CB1> | <CB1> | abstract <class_def><CB> | final <class_def> <CB>| <class_def> <CB>| ~
<CB_Class> → <acc_choice> <CB1> | <class_def><CB>
<acc_choice> → <access_modifiers> | ~
<static_choice> → static | ~
<CB1> → DT<fn1><CB> | void <func><CB> | ID <fn2><CB>
<fn1> → ID <fn_simple> | [ ] ID <fn_arr>
<fn_simple> → (<def>) {<MST1>} | <init><list>
<fn_arr> → (<def>){<MST>} | <init_arr><list_arr>
<fn2> → ID<fn2_simple> | [ ] ID <fn2_arr> | (<def>){<MST1>}
<fn2_simple> → (<def>){<MST1>} | <obj_init><obj_list>
<fn2_arr> → (<def>){<MST>} | <obj_init_arr><obj_list_arr>

First(<class_st>)→ static, abstract, final, class	Follow(<class_st>) → static, abstract, final , class , }
First(<class_def>) →class	
First(<class_choice>) → static, abstract, final, ~	**Follow(<class_choice>) → class**
First(<inhrt>) -- > extends,~	**Follow(<inhrt>) → {**
First(<inhrt_choice>) → , , ~	**Follow(<inhrt_choice>) → {**
First(<CB>) → static, public , protected, private, DT , void , ID , abstract, final, class~	**Follow(<CB>) → }**
First(<acc_choice>) → public, protected, private, ~	**Follow(<acc_choice>) → DT ,ID, void**
First(<static_choice>) → static, ~	**Follow(<static_choice>) → DT ,ID, void**
First(<CB1>) → DT, void , ID	
First(<fn1>) → ID, [	
First(<fn_simple>) → (, = , , , ;	
First(<fn_arr>) → (, = , ; , ,	
First(<fn2>) → ID, [, (	
First(<fn2_simple>) → (, = , , , ;	
First(<fn2_arr>) → (, = , , , ;	

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This_st (This Statement)	
<this_st> → this . | ~	
First(<this_st>) → this , ~	**Follow(<this_st>) → ID**

Try_st (Try Catch Finally Statement)	
<try_st> → try { <MST> } <catch_st><finally_st> <catch_st> → catch(ID ID) { <MST> } <catch_st1> <catch_st1> → <catch_st><catch_st1> | ~ <finally_st> →finally {<MST>} | ~	
First(<try>) → try	
First(<catch_st>) → catch	Follow(<MST1>) → }
First(<catch_st1>) → catch, ~	**Follow(<catch_st1>) → if, while, for , try, this, inc_dec, ID ,DT , continue, break, return, } , finally**
First(<finally_st>) → finally , ~	**Follow(<catch_st1>) → if, while, for , try, this, inc_dec, ID ,DT , continue, break, return, }**

Access Modifiers	
<access_modifiers > → public | private | protected	
First(<access_modifiers>) → public , private , protected	

Func (Function)	
<func> → ID(<def>) { <MST1> }	
First(<func>) → ID	

Class Repeatition	
<class_rep> → <class_st> <class_rep>| ~	
First(<class_rep>) → static, abstract, final , class , ~	**Follow(<class_rep>) → }**

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Starting	
<S> → namespace ID { <class_rep> }	
First(<S>) → namespace	Follow(<S>) → $

While_st (While Loop)	
<while_st> → while(<OE>) {<MST>}	
First(<while_st>) → while	

If_else (If Else)	
<if_else> → if (<OE>) { <MST> } <o_else> <o_else> → else <if_choice> | ~ <if_choice> → <if_else> | { <MST>}	
First(<if_else>) → if	
First(<o_else>) → else , ~	**Follow(<o_else>) → if, while , for , try, this, inc_dec , ID ,DT, continue, break , return , }**
First(<if_choice>) → if , {	